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Soviet Geography: Review and Translation

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TRANSLITERATION TABLE

Russian			English	Russian			English
А	а	*а*	a	Р	р	*р*	r
Б	б	*б*	b	С	с	*с*	s
В	в	*в*	v	Т	т	*т*	t
Г	г	*г*	g	У	у	*у*	u
Д	д	*д*	d	Ф	ф	*ф*	f
Е	е	*е*	e*	Х	х	*х*	kh
Ж	ж	*ж*	zh	Ц	ц	*ц*	ts
З	з	*з*	z	Ч	ч	*ч*	ch
И	и	*и*	i	Ш	ш	*ш*	sh
Й	й	*й*	y	Щ	щ	*щ*	shch
К	к	*к*	k	Ъ	ъ	*ъ*	"
Л	л	*л*	l	Ы	ы	*ы*	y
М	м	*м*	m	Ь	ь	*ь*	'
Н	н	*н*	n	Э	э	*э*	e
О	о	*о*	o	Ю	ю	*ю*	yu
П	п	*п*	p	Я	я	*я*	ya

(*) Instead of e, use ye at the beginning of names, after vowels and after the soft sign (').

The transliteration table is supplied for the general information of readers and to enable them to identify the geographic names on maps that will be reproduced from time to time in SOVIET GEOGRAPHY.

The transliteration system is the one proposed by the United States Board on Geographic Names. For more general use in textbooks and other popular needs, the following simplifications are recommended by the editor of SOVIET GEOGRAPHY:

1. Eliminate the use of (') and (").
2. Use i for iy, and y for yy.
3. Convert diphthongs ay, ey, oy, uy to ai, ei, oi, ui.

THIRD CONGRESS OF GEOGRAPHICAL SOCIETY USSR

THE CONSERVATION OF NATURE AND THE GEOGRAPHIC SCIENCES
(as illustrated by the Ukraine)

By P. S. Pogrebnyak

1. Aims of the Conservation of Nature

The seven-year plan for the development of the national economy, science and culture, adopted by the 21st Congress of the Communist Party, has opened prospects for the further development of the productive forces of the Soviet Union, the growth of economic benefits for the people and the rational utilization and enlargement of the natural resources of the country.

In the important field of the rational utilization of the natural resources the geographic sciences stand out as the chief representatives of learning. The methods of geography can also be used to make a diversified study and find the solution of the most important problems of the conservation of nature, which has to deal not only with its individual elements (plants, animals, soils, rocks, etc.) but also with geographic landscapes, as well as with the whole sum of natural and economic conditions specific to each region.

The objects of the conservation of nature are, first of all, the original natural elements - flora and fauna of the forests, meadows, steppes, deserts, etc. The most popular of these are the forests and the animal life of the land and bodies of water, as well as artificial plantings - urban greenery, stands of green trees and shrubs along roads and along shores of artificial and natural bodies of water, shelter belts and tree plantings in the steppe and many other elements of nature that play a role in enlarging the natural resources of a Socialist society and in creating a healthful way of life for man.

The central task of the conservation of nature is care for the human being, the satisfaction of his need for being closely bound to nature, to breathe fresh air, to enjoy the blessings of living in nature, which are difficult to classify in all their fullness and variety. The conservation and multiplication of the valuable objects of nature, the renewal and new creation of those that have been lost through the spontaneous development of society in past epochs but still have vital significance for society -- this is the most general, and also to some extent concrete, formulation of the tasks of the conservation of nature.

When the tasks of the conservation of nature are approached on a governmental level, the first proposals to arise also relate to living nature. They aim at the preservation from ultimate extermination of plants and animals of interest in forestry and hunting as well as fishing. Indeed, the preservation of rare and useful plants and animals stands out as the most critical and urgent task, for rare organisms are rapidly and often irretrievably exterminated.

Even in the Paleolithic epoch the human population, though small at the time, exterminated such powerful animals of the northern latitudes as the mammoth and the woolly rhinoceros, which played a major role as an object of hunting and as an important source of food.

The Scythians, who lived in the Lower Dnieper region in the Bronze Age, almost wiped out the pine forests of Hylaea, which, according to Herodotus covered more than a thousand square kilometers in the steppe plain of the Lower Dnieper. On the site of Hylaea along the whole left bank of the Dnieper from Kakhovka to the mouth of the Dnieper now extend the Oleshki desert sands. This change was brought about by man in early Scythian times, when he was still poorly equipped with tools for cutting down the forest.

In more recent times the reckless extermination of animals has wiped out valuable species suited for domestication, artificial breeding or at least for the utilization of their positive hereditary characteristics in creating new breeds of domestic animals by hydridization methods. The urus and the wild tarpan horse (the last specimen was shot in 1871) have completely disappeared from the Ukrainian steppe. Entirely gone are Steller's sea cow, which lived in the Bering Sea, the dodo bird on Mauritius, the gigantic wingless moa bird, the wingless auk in the Atlantic, and other valuable species of animals (I. G. Pidoplichko, 1958).

Sometimes the cause of extinction has been the lack of the instinct of self-preservation in the wild animal with respect to man. At the same time the trustfulness of wild animals is a rare and most valuable property conducive to their domestication. In other words, precisely those animals that are of greatest value have been irretrievably exterminated.

V. I. Lenin in 1922 addressed to the People's Commissariat of the Workers' and Peasants' Inspectorate a memorandum in which he pointed out the inadmissibility of the reckless catching of fish fry and the necessity of severely punishing persons responsible for these violations. Lenin wrote: "The chief of the water-resource service of the Donprodkom has been removed from office for the reckless catching of fish on the lower Don. This gentleman was merely removed from office. It must be determined where he is and established a little more seriously whether he has been adequately punished."

On the subject of the unrestrained, planless and ultimately wasteful exploitation of natural resources, Karl Marx wrote: "Culture, when developed spontaneously and not deliberately directed, leaves a desert behind it: Persia, Mesopotamia, Greece, etc." (K. Marx and F. Engels, Collected Letters, OGIZ, Gospolitizdat, 1948, p. 202).

Similar cases of extermination can also be cited in the plant world, though the irretrievable disappearance of species of plants under man's influence is not so frequent. The yew, once distributed throughout the Carpathians, was almost wholly wiped out in the last century. At the beginning of the 20th

century, the Guzul dug up the roots of yews cut down many decades before and sold them by weight to Austro-Hungarian furniture manufacturers.

In the Ukraine some valuable local forms (varieties, strains) of pine, oak and other tree species have been wiped out. Foresters have used seeds of indeterminate origin in forest plantings because of the disappearance of the natural forests. Everywhere we now find pine and oak switch growths, middle-aged or maturing artificial stands that have crooked, gnarled and bushing trunks and low-grade wood.

In general, the significance of the geographic localization of heredity nowhere asserts itself so strongly as in the variegated stands of tree species. Through the work of a number of Ukrainian silviculturists -- V. D. Ogiyevskiy, A. I. Kolesnikov and the author of this paper -- so-called "geographic cultures" of pine, oak and ash have been created, beginning in 1899, in a number of places in the Ukraine (Nikol'skoye and Goloseyevka forestry districts in the environs of Kiev, the Sobich forest near Novogorod-Severskiy, the Trostyanet forestry district in Sumy Oblast and Velikoanadol'-skoye forestry district in Stalino Oblast). They have shown that the best generations with respect to productivity and hardiness under the local conditions are those that have arisen from the seeds of local pine, oak and ash. The transfer of seeds of these species from one forest to another, from one locality to another over a distance of more than 250 km. lowers the quality of the cultures compared with those from local seeds. In extreme cases thoroughly bad results are obtained. Thus, very short, almost dwarf-like, though well-proportioned pines develop in the Ukraine from the seed of pine growing in Murmansk Oblast. One-year-old pine trees grown in Leningrad from pine seed from the Cherkassy forest were stricken by the first fall frost (V. V. Ogiyevskiy, 1916), as if some subtropical plant, not the ordinary pine, had been brought to Leningrad.

From these and similar facts, mainly experimental, it must be concluded that it is necessary everywhere to preserve the geographic diversity of valuable wild plant and animal populations created through thousands of years and adapted to local conditions. For this purpose, the last surviving remnants of natural forests, steppes, swamps and other plant associations must be carefully protected. An extensive network of nature preserves must be created specially for the protection of the natural forms (breeds, varieties) of wild plants and animals. Such a network must be founded upon consistent geographic principles.

On the basis of the well-known wingéd words of G. F. Morozov, "the forest is a geographic phenomenon," we can say that the hereditary properties of the small classification units of plants and animals belong to strictly geographic phenomena of major economic significance.

Along with the protection of plant and animal life, conservation has recently also begun to cover the geographic environment -- atmosphere, soils, bodies of water (rivers, lakes, ponds and large reservoirs and rare or

picturesque geologic phenomena (heights, cliffs, canyons amid a plains landscape, etc.).

Conservationists are faced with a great task: to struggle against the violators of Soviet laws and contribute to the promulgation of a law for the preservation of nature, creating a firm basis for all conservation measures.

2. The system of nature preserves in the Ukraine and the tasks of the geographic sciences

The Ukraine is rich in picturesque places. I recall the well-known fragment from A. K. Tolstoy's poem:

"You know the land where everything breathes abundance.
"Where rivers gush purer than silver,
"Where the feathergrass of the steppe nods in the breeze
"And villages drown in greenery."

The present-day Soviet Ukraine is richer than the older Ukraine in natural resources if only because it includes the mountain system of the Eastern Carpathians, the Beskids, and the whole Crimean Peninsula with its mountains and its south coast. Ukrainian kolkhozes and sovkhozes breathe abundance; Ukrainian industrial projects, cities, parks and tree-lined roads have a majestic beauty.

The Ukrainian SSR has an area of 603,000 square kilometers. The vertical range of relief is 2,058 m. (altitude of Mt. Goverla in the Carpathians). The Carpathian mountains include a wide range of mountain-forest belts from oak, principally on the plain, through wide belts of beechwoods to the fir-and-spruce mountain tayga at altitudes of 700-800 to 1,500-1,800 m. Above this follows stunted forest of mountain pine and the Carpathian poloniny, or alpine meadows.

The Crimean mountain region is represented by an equally complex gamut of belts, including the southern coast with its relatively typical Mediterranean climate and vegetation. The summer climate of the south coast with its characteristic rainlessness and three hot months is common for the whole northern Mediterranean area.

Latitudinal zonality is reflected in the broad physical-geographic range of zones, beginning with the forest zone of the principally pine-bearing Poles'ye (very swampy in the northern subzone, and having in this case the typical appearance of a light pine tayga), through the extensive forest-steppe and steppe zones to the semi-deserts on both shores of the Sivash and on the Crimean shore of the Sea of Azov. The total annual precipitation varies from 600-650 mm. in the Poles'ye to 275 mm. in the more arid sections of the Black Sea region and the Sea of Azov. There is a parallel increase in the duration of the warm and hot periods of the year and in the cumulative heat sums, which increase evaporability to 1,000 mm. (and even somewhat more)

per year. G. N. Vysotskiy's ombro-evaporometric correlation ratio drops from 1.5 in the north to 0.25 in the south, signifying a sixfold increase in the aridity of the climate between the extreme points of the longitudinal geographic profile (north to south).

In the latitudinal direction, from west to east, it is the continentality of the climate that increases. The difference in the mean January and July temperatures grows from 20° in the west, within the eastern Carpathians and the adjacent plains to 28° in Khar'kov and Lugansk oblasts. These variations impose their imprint upon the composition of the natural forest vegetation. In passing from the comparatively mild climate of the Western Ukraine (a "beech climate," according to Köppen) to the continental climate of the eastern part of the republic, the beech, the mountain (rock) oak, the sycamore maple, the cherry, the hornbeam and other components of the Western European broadleaf forest successively disappear from the forests. In the east, only the European oak, the ash, the Norway maple, the linden and the elms remain in the composition of the tree groves.

Poles'ye. This once solidly forested zone has an average forest cover of only about 30%. The forests of the Poles'ye, after intensive cuttings over the larger part of their territory, are now represented by young growths. The abundance of moisture is a favorable factor for the restoration of forests and (indirectly) of forest fauna, elk, red deer, roe buck, wild boar, black grouse, hazel grouse and other species, which once inhabited the Ukrainian Poles'ye in abundance.

Completely untouched virgin areas have not survived in the Poles'ye because of the lack of state nature preserves in the past. Birch and aspen now predominate in the composition of the humid forests. In higher sections, particularly on sand hillocks, where natural pinewoods and subori (woods carpeted with green or white mosses) were formerly distributed, young pine plantings now predominate. The dominance of young pine sapling growths over considerable areas results in a change in the microclimate toward greater dryness, chiefly because of the shifting of the underlying surface from the height of the crowns of the formerly predominant adult pines to the surface of the sand or to the low canopy of young pines. The massive multiplication, in the Poles'ye, of the southern wasteland fauna of insects feeding on pine, such as the cockchafer, the bark beetle and others, is due to the above-mentioned change in the microclimate over large expanses as a result of the cutting down of the forests.

With the object of preserving the least altered forests of the Poles'ye zone, we are planning the organization of a Poles'ye nature preserve in the most forested and typical places. In it are to be included the forests of six forestry areas: Olevsk, Emil'chino and Gorodnitsa in Zhitomir Obl., with an area of 50,805 ha., Rakitnoye, Stepan and Sosnovka in Rovno Oblast, with an area of 41, 120 ha.; the Shatskaya Forest Tract in the Volyn Oblast (8,817 ha.), Lake Kremno (200 ha.) and the Staro-Gutskoye Forestry District in Sumy Oblast (7,000 ha.). These areas, in spite of their being exhausted by cuttings, will restore their own natural environment under the

conditions of a nature preserve. They reflect all types of forest of the Ukrainian Poles'ye.

The forest-steppe zone of the Ukraine is vast and varied in its landscapes: the steppe plateaus occupied by fields, the oak forest tracts on the gulch-gashed rivers of the Right Bank, the river floodplains, the pinewood terraces, the old loess-covered steppe terraces of the rivers, etc. In the West the forest-steppe comprises the toltry (conical hills of Tertiary bryozoan-reef limestone) landscape, the unique landscapes of the Pokut'ye and Rostoch'ye regions, the Carpathian foothills, etc. All these will be represented in the network of nature preserves.

There is a plan for a Donets forest-steppe nature preserve on the territory of the Kremennoye game preserve in Lugansk Oblast, with an area of 12,281 ha., the Komsomol'skoye Forestry District of the Kremenskiy Forest Area, with an area of 3,674 ha., the Gomol'shanskaya Forest Tract of the Korobovskoye Forestry District of the Zmiyev Forest Area in Khar'kov Oblast, with an area of 1,843 ha. All these represent characteristic oak and pine forests of the Donbas. In addition to this, it is proposed to organize in this same region the Gory Artema nature preserve in Stalino Oblast for the sake of a section of pine forest on Cretaceous slopes, as well as the Savur-Mogila area of Stalino Oblast and the Grabovaya Balka (upper course of the Mius) with a residual occurrence of hornbeam.

There are plans for nature preserves in the Dikan'ki forest near Poltava with its relict vegetation, in the Krasnyanskoye Forestry District of the Trostyanets Forest Area, and in the Get'manshchina area near Poltava.

In the right-bank forest-steppe there is a plan for the restoration of the Kanev nature preserve, a hornbeam oak-grove of 1,414 ha. As new nature preserves, we are also proposing the Chernyy Les oak tract near Znamenka station, the Golochanskoye Forestry District of the Golovanevka Forest Area and the Savran Forest Area with its easternmost occurrence of mountain (rock) oak. Awaiting inclusion in a preserve is the easternmost occurrence of beech in the Satanov Forestry District near Khmel'nitskiy and other forest tracts in the toltry landscape, as well as residual limestone hills in the town of Kremenets.

Deserving inclusion in a nature preserve are forest tracts along the Dniester on its craggy slopes, with natural occurrences of a number of representatives of Mediterranean-Balkan flora.

Much worse is the situation with regard to steppe nature preserves of the forest-steppe zone. During the war the famous Karlovka Steppe of Poltava Oblast was almost entirely lost. In this zone there remained only a single steppe nature preserve, the Mikhaylovka preserve in Sumy Oblast, with an area of only 202 ha., a typical forest-steppe section of the variherbaceous-feathergrass steppe enriched with meadow elements.

Peculiar to the steppe zone of the Ukraine in the past were certain zonal subtypes of vegetation, of which the variant of the northern subzone is at present better represented than the others, in the form of a colorful fescue-and-feathergrass cover with surviving bobac in the Strelets Steppe of Lugansk Oblast, an area of 525 ha., as well as the Khomutovka Steppe in Stalino Oblast, an area of 1,112 ha. Thus far unprotected is the Proval'skaya Steppe in the Donbas. A valuable steppe nature preserve can still be created there.

The world-famed virgin steppe land of Askaniya Nova, which by the first decree of the Soviet Government in 1921 was declared a nature preserve on an area of 20,000 desyatiny (54,000 acres), is now represented by a protected area of only 500 ha. (1,235 acres). This is almost the only section of virgin steppe of the southern, arid fescue-and-feathergrass type on dark-chestnut soils with three species of feathergrass, with the varicolored spring aspect characteristic of this steppe and the early desiccation of the vegetation. Unfortunately, the area of the Askaniya Nova virgin land is being constantly reduced and, before it is too late, it is necessary to attach to the existing protected section not less than 2,500 additional hectares of relatively well preserved virgin land as subject to restoration.

The Black Sea State Nature Preserve, embracing a territory of 9,695 ha. of land and 36,000 ha. of water area can also be expanded, particularly with the sandy steppes of the Kinburnskaya Kosa. To it should be added the former nature preserve of the sandy steppe with the Burkuty birch groves, which has been ruined in recent times. The Black Sea Nature Preserve is a complex of salt and fresh-water lakes and salt-marshes of the sandy steppe with seashore flora and fauna. Its main significance lies in that it is a nesting and resting place for migratory birds. To it should be added also the Tendrovskiy Bay, the Sara-Bulatskiye Islands, the southern part of the Karkinitskiy Zaliv, Dzharylgach Island, the western part of Dzharylgach Bay and the Konskiye Islands with the adjacent strip of seashore and water. Awaiting protection are the Obitochnaya Kosa on the Sea of Azov and the lower part of the Danube delta, where a large quantity of game waterfowl (swans, geese, ducks, gulls, etc.) winter.

The Crimean mountain-forest state nature preserve is being preserved as a model hunting district. However, many Crimean vegetation areas valuable enough to be protected are still awaiting their turn. They include the shrub-and-steppe vegetation of the Tarkhankut hills, certain small, surviving virgin steppe lands in the Northern Crimea and on the Kerch' Peninsula, a grove of Pitsunda pine near Sudak, the volcanic massif of the Karadag, which deserves to become a geographic landscape preserve, the karst caves of Chetyrdag, and other objects.

Finally, the question of the organization of a Carpathian landscape preserve, representing all the plant belts of this mountain system, awaits a rapid solution. At present it has become difficult to organize a Carpathian nature preserve composed of forest and poloniny (alpine meadows)in one

place. However, the preserve can be organized in the form of a major tract with an area of 40,000 to 50,000 ha. and two or three outliers each with a size of 5,000 to 10,000 ha. The main tract is to be in the Chornogory region; it embraces a part of the Rakhov Rayon of the Transcarpathian Oblast. The outliers of the preserve will be, in particular, the Ugol'ki and Velikiy Lug areas with 8,000 ha. of beech forest. Other areas to be included in the Carpathian Preserve are: 1. the Atak oak forest in Beregovo Rayon on the Borzhava River; 2. the Siberian stone pine forests in the Gorgany; 3. the Scotch pine forests of the Carpathians, small in area and scattered in different places; 4. the yew tract in Knyazhdvor; 5. the summit of Mount Bliznitsa.

The above-mentioned list of nature preserves and natural monuments is not exhaustive. It is extremely urgent and indispensable that it should be implemented in the very near future, as it constitutes the main part of what should be preserved for future generations.

Geographic study stations should be organized in the nature preserves to use a unified methodology on the study of the circulation of matter and energy in the plant-animal-soil-atmosphere system. Since such studies use an integrated approach, their guidance should be concentrated in the Institute of Geography of the Ukraine, to which the extensive network of nature preserves should also be subordinated.

Let us point out the chief problems of integrated studies at the geographic stations in the nature preserves:

1. Study of the plant cover and soil microflora in the natural biocoenoses.
2. Study of the animal life of the nature preserves.
3. Study of the interrelations between the components of the natural biocoenoses and the extraneous elements.
4. Study of the water-and-heat and air balance (exchange) in the atmosphere-plant-ground system.
5. Study of the exchange of matter (chiefly nitrogen, sulfur, phosphorus, potassium, calcium, magnesium, etc.) between the soil and the vegetation in the natural biocoenoses.

Such a program of investigations, if it includes moreover a comparison of the virgin environment of the nature preserves with the environment of the neighboring sections of kolkhoz and sovkhoz lands altered by cultural action, will have not only a theoretical, but also an important practical interest for the solution of the concrete tasks of raising the productivity of agriculture and forestry, where the elements of the heat, water, air, nitrogen and other balances play a prime role.

If one may be permitted to express oneself somewhat metaphorically, the millenial "experience" of nature must also be exploited to raise the productivity of the Socialist national economy, primarily to increase the productivity of agricultural plants and animals.

In the institutes of geography it will be useful to organize special departments for the station study of nature with laboratories for recording and analyzing its individual elements: physical-meteorologic, soil-agrochemical, soil-microbiologic and ecologic. It will be useful to examine the question of organizing an integrated Institute for the Conservation of Nature in the system of the Academy of Sciences of the USSR, similar to that existing in the Polish Academy of Sciences. Along with geographers, botanists, zoologists and biochemists, it will be necessary for physicians to participate in the general complex of investigations of natural plant problems to solve these important questions of the conservation of nature from the standpoint of the care for man, his longevity and health.

Man living in a Communist society will undoubtedly be more informed and cultured, more demanding and interested than we and our contemporaries. Vast amounts of leisure and geographic expanses will be offered to his curiosity. We must avoid reproach from him for the poor conservation of nature, for a negligent attitude toward its rare and unparalleled phenomena, like the reproaches that we rightly level at our predecessors. It appears to us that the viewpoint of future man is essential in the practical solution of questions of the conservation of nature. It demands the urgent implementation of maximal programs for the protection and conservation of nature and its diversified geographic study.

THE NATURAL RESOURCES OF THE UKRAINIAN SSR AND WAYS OF USING THEM RATIONALLY

By B. G. Bondarchuk, I. Ye. Buchinsky, A. T. Dibrova, P. K. Zamoriy, A. B. Kistyakovskiy, M. I. Kotov, V. A. Nazarov, P. S. Pogrebnyak, S. P. Radionov and A. A. Khramov

Introduction

The 21st party congress adopted the control figures of the seven-year plan for the further development of the Soviet national economy.

The utilization of the natural wealth of the USSR, and particularly the Ukrainian SSR, occupies a special place in the seven-year plan. The USSR possesses large reserves of varied natural wealth and resources. The USSR holds a leading place in the world with respect to explored reserves of coal, petroleum, gas, iron ore and other minerals necessary for the rapid development of the national economy. It is better provided than other countries with metallic ores, ores for the production of fertilizers and other chemicals, non-metallics for the building industry and with water-power resources.

The chief task of the seven-year plan for the development of the national economy of the USSR in 1959-65, as pointed out in the control figures, is the further stimulation of all branches of the economy on the basis of the priority growth of heavy industry, and an intensification of the country's economic potential to insure the raising of the people's living standard.

In his report to the 21st congress, N. S. Khrushchev, in characterizing the ways of creating the material-technical basis of communism, said: "The creation of the material-technical basis of communism presupposes above all: the existence of a highly developed modern industry, complete electrification of the country, scientific-technical progress in all branches of industry and agriculture, integrated mechanization of all the production processes, thorough utilization of new sources of energy, of rich natural resources and of synthetics and other new materials, the growth of the cultural-technical level of all workers, the further improvement of the organization of production and the raising of the productivity of labor."

The seven-year plan provides for a more intensive exploitation of economical and high-grade natural resources, for moving industry closer to sources of raw materials and fuel and to regions of consumption, for an improvement of interregional economic ties, a reduction in the distance of freight hauls and the most rational utilization of labor resources.

In the realization of the tasks of the seven-year plan a large place belongs to the natural resources of the Ukrainian SSR. A thoroughly scientific formulation of ways of making the most efficient and rational use of all kinds

of natural resources is the honored and primary task of Soviet geographic science.

It should be noted that only in the Socialist economy of the USSR are workers of all ethnic entities striving to unite their efforts to solve the economic and political problems of the seven-year period.

The present paper deals with the natural resources of the Ukrainian SSR as now known.

Paleogeography as a Method of Providing a Scientific-Theoretical Foundation for the Expansion of the Mineral Raw-Material Base of the Ukrainian SSR

The main task of paleogeography consists in establishing the sequence of changes in the physical-geographic conditions of the earth's surface and the geologic-historical development of the earth's crust and its parts. Within the limits of this broad task, importance for the solution of problems of applied geology is attached to questions of the physical-geographic conditions of the provinces of derivation, the movement of mineral matter and the characteristics of the areas of accumulation. They determine, in the final analysis, the laws of the geographic distribution of mineral concentrations in the earth's crust.

Paleogeographic conditions form the chief basis for compiling maps of expected mineral deposits connected with the old crust of weathering, metallics and nonmetallics of sedimentary origin and, especially, placer deposits.

Integrated paleogeographic studies have evolved on a large scale in recent years in the Ukraine. Their chief object is to ascertain the laws of distribution of mineral deposits and to formulate a scientific-theoretical basis for forecasting them under the specific conditions of tectonic structure and stratigraphic complexes.

As a result of the wide use of the paleogeographic study method, geological work has achieved substantial scientific and practical results. These include the compilation of an atlas of paleogeographic maps of the Ukrainian SSR.

The Institute of Geological Sciences of the Academy of Sciences of the Ukrainian SSR has created, in celebration of the 40th anniversary of the Soviet Ukraine, an atlas of paleogeographic maps at a scale of 1:2,000,000. The atlas comprises 75 paleogeographic maps and 6 maps of geologic sections reflecting the sequence of geologic development and the changes in the physical-geographic conditions on the territory of the Ukrainian and Moldavian SSR's from the Reef times (upper Proterozoic) to the Quaternary Period.

The age was adopted as the basic time unit for the paleogeographic maps of the atlas, and the stage in deposits.

Before compilation of the paleogeographic maps a great amount of preparatory work was done. On the basis of the tectonic map compiled by the Institute of Geographical Sciences of the Ukrainian SSR, a scheme of the structural-geologic regionalization of the Ukrainian and Moldavian SSR's was worked out. To tie together the paleogeographic maps and the deposits represented in different regions of the studied territory in different facies, a comparative scheme of stratigraphic subdivisions was worked out. Into this scheme were introduced all the subdivisions recognized in the Stratigraficheskiy Slovar SSSR (Stratigraphic Dictionary of the USSR). This facilitates the use of the paleogeographic atlas in solving both broad geographic problems and various specific tasks.

The paleogeographic maps reflect the general physical-geographic conditions and show the main lithologic types of deposits of corresponding age, the distribution of the mineral concentrations and a number of other features, which to a certain degree explain a given facies condition of sediment accumulation or a given geomorphic characteristic. These features include the carbonate content, coloring, the rock-forming organisms and, for later epochs, cames, eskers, archeological finds, etc.

The physical-geographic conditions are shown on the paleogeographic maps with differentiation of the depths of the sea and the character of its salinity. The hypsometric levels of the land and the character of the areas of accumulation are shown on the continents. Details of the physical-geographic conditions -- the vegetation zones, river network, etc. -- are given only for maps characterizing the Quaternary Period. The contours of physical-geographic areas are shown arbitrarily. Attached to the paleogeographic maps are explanatory notes on the history of the geologic development of the territory of the Ukrainian and Moldavian SSR's. The notes justify the choice of boundaries of distribution of physical-geographic conditions; describe the structural-tectonic elements, give a facies analysis of the deposits; characterize their thickness, the provinces of mineral derivation, the transportation and deposition of fragmental materials. These data supplement the paleogeographic maps and enlarge the possibilities of using them for forecasting deposits of various kinds of mineral raw materials.

A comparison of the paleogeographic maps for different sections of time gives a clear notion of the sequence of the geologic development of the country.

By the beginning of the Reef times the surface of the Ukrainian Crystalline Shield had been completely leveled. On the surface of the crystalline rocks a thick crust of weathered materials had been formed by that time. The western margins of the shield and the Dnieper-Donets depression were possibly areas of accumulation of marine and continental deposits. The boundaries of the areas of accumulation varied with tectonic movements.

The physical-geographic conditions in the southwestern part of the European territory of the USSR during the Cambrian Period are portrayed

on the maps for the Early Cambrian, Middle and Late Cambrian epochs. The beginning of this period was marked by a considerable transgressions of the sea in the southwestern, western and northwestern regions of the republic. On a lesser scale, the transgression of the sea was repeated in the Middle and Late Cambrian epochs. The Ukrainian Crystalline Shield at that time represented elevated dry land.

An expansion of the sea area took place in the first half of the Ordovician Period; it was accompanied by a general subsidence and lowering of the surface of the land.

An especially considerable transgression of the sea upon the territory of the Ukrainian and Moldavian SSR's took place at the beginning of Late Silurian times. It gave rise to two marine areas of shallow, epicontinental and open sea of the geosynclinal zone. The Ukrainian Crystalline Shield represented lowered dry land. At the end of the Silurian Period, owing to uplifts of growing intensity, a regression of the sea occurred. Volcanogenic materials begin to play a perceptible role in the composition of the Upper Silurian deposits.

The physical-geographic conditions in the southwestern part of the European territory of the Ukrainian and Moldavian SSR's during the Devonian Period varied within broad limits. They are reflected in the paleogeographic maps of the Eifel, Frasnian and Famennian ages. In the Early Devonian epoch land conditions predominated; in Middle Devonian times half-closed shallow seas and lagoons existed; a wide transgression of the sea occurred in the Late Devonian epoch. The considerable subsidences in the Devonian period began in the Dnieper-Donets zone. They were accompanied by major crustal fractures and related intense volcanic activity. A characteristic of the sedimentary strata of Devonian age are variegated colors, salt-bearing formations and volcanogenic formations. In the Dnieper-Donets depression the Devonian deposits are petroleum-bearing.

Considerable variability of the physical-geographic conditions occurred in the Carboniferous period. The paleogeographic maps of this time reveal the sequence of the changes in conditions favorable to coal accumulation. The Early Carboniferous epoch is characterized by an invasion of the sea, which reached its maximum in the Oka age. Characteristic of this section of time is the predominance of marine carbonate, terrigenous or carbonate-and-terrigenous sediment accumulation. In the marginal parts of the basins there was formation of peat. Repeated transgression by the sea occurred at the beginning of the Middle Carboniferous epoch in the Early Bashkir age. Later there was a gradual recession of the sea and local invasions By the end of the Carboniferous period the marine conditions of sediment accumulation gradually become more and more restricted. In the deposits there is an increase in the role of lagoon-marine, lagoon and, in part, continental strata, often varicolored. The processes of coal accumulation were widely represented. Sedimentary strata attained immense thicknesses.

On the south, the Russian Platform in the second half of the Carboniferous period was fringed by mountain ridges extending from the Caucasus across the Crimea and the Dobrudja to the Eastern Carpathians.

The physical-geographic conditions on the territory of the Ukraine and adjacent regions changed sharply at the end of the Paleozoic. Their characteristics are reflected in the five paleogeographic maps characterizing the Permian period. At the beginning of this period the whole territory of the Ukraine was dry land. The axial zone of the Dnieper-Donets depression was a lowland, within which an insignificant accumulation of sediment took place. The sea waters penetrated from time to time into the northwestern margins of the Donets Ridge. This was accompanied by sedimentary accumulation of salt-bearing strata. Sea existed in the Crimea. In Late Permian times large expanses of the Ukrainian SSR entered into a subsidence phase. In the Arti age the sinking was accompanied by the accumulation of marine, lagoon and continental formations over considerable areas. The northwestern margins of the Donbas and the Dnieper-Donets depression had fresh-water lagoons, united along the northern slopes of the Donets Ridge by a strait with the Kazan' Sea. The conditions of principally continental sediment accumulation also persisted in the beginning of the Mesozoic era.

The physical-geographic conditions of the Mesozoic era on the territory of the Ukrainian and Moldavian SSR's are marked by exceptional diversity.

The predominance of continental conditions characterizes the Triassic period. Shallow marine water conditions of sediment accumulation were maintained in the Crimea.

Fourteen successive phases occurred in the change of physical-geographic conditions during the Jurassic period. Their characteristics are reflected in the corresponding paleogeographic maps characterizing the Lower and Middle Lias, the Toarcian and Aalenian ages, the Early and Late Bajocian, the Early and Late Bathonian, the Early, Middle and Late Callovian, the Early and Late Oxfordian, the Early and Late Kimeridgian, and the Tithonian Age.

In Callovian and Oxfordian times the sea spread over almost the whole territory of the Ukrainian SSR.

The beginning of the Cretaceous period in the southwestern part of the Russian Plain is characterized by predominance of continental conditions. In the geosynclinal zone there was an alternation of marine and continental circumstances. At the end of the Early Cretaceous there was a transgression by the sea on the territory of the Ukraine. It reached its maximum in the Turonian and Campanian ages. In the Maestrichtian began the regression of the sea, which was completed by the formation of insignificant residual basins in the Danian times.

A complex change in the physical-geographic conditions on the territory of the Ukrainian and Moldavian SSR' s took place in the Cenozoic era.

The beginning of the Paleogenic period on the territory of the Ukraine is characterized by the predominance of dry land. At the end of the Eocene there was an extensive transgression by the sea in the south of the USSR. A large part of the territory of the Ukrainian SSR was covered with water. In the following ages the sea gradually receded. The regression, however, alternated periodically with regional transgressions. The most considerable advance of the sea took place in Middle Sarmatian and Pontic times.

On the border between the Pliocene and the Postpliocene the sea receded into the limits of the present shoreline. Under conditions of considerable lowering of the erosion level the formation of the valleys of the present rivers was completed. Elevation of the level -- the Euxine Sea -- took place in the Pleistocene in conjunction with the Dnieper glaciation. Subsequently, the level of the Black Sea was higher than at present, in Uzunlar, Karangot and Azov-Black Sea times.

It is possible to trace on the paleogeographic maps the gradual outline of the mountain structures of the Crimea and the Eastern Carpathians, surrounded by the fiery ring of volcanoes of Transcarpathia.

The lithofacial composition of the sediments of the Cenozoic era is marked by great diversity. Connected with them are many mineral deposits. Of great economic importance are the Tertiary coal-bearing and salt-bearing formations, the petroleum- and gas-bearing strata, the iron-ore, manganese and bauxite deposits, the placers of valuable minerals in the beds and on the terraces of present-day rivers, in the old buried river valleys and shore zones of the seas of the geologic past, reconstructed on the maps of the paleogeographic atlas.

Minerals of the Ukraine

The Ukrainian SSR occupies one of the first places in the Soviet Union with regard to minerals.

The peculiarities of the geologic-historical development of the territory of the republic contributed to the formation of the great diversity and immense masses of mineral raw materials in its depths. There is a definite law expressed in the geographic distribution of the Ukraine's minerals.

Connected with the area of distribution of the Pre-Cambrian Ukrainian Crystalline Shield are the deposits of iron and of titanium, nickel, chromium, aluminum, graphite and other ores. Connected with the Dnieper-Donets depression, with the Donbas and with the L'vov-Volhynian depression are large deposits of bituminous and anthracite coal, as well as deposits of petroleum and natural gas and other minerals.

A large amount of work on the study and location of mineral raw-material resources and their exploitation has been done in the post-war period of the construction of socialism in the USSR. During this period many new

mineral deposits have been discovered and developed, and the known reserves of previously discovered deposits have been expanded.

A major place in the post-war growth of our economy belongs to the metallurgy of the Ukraine and its ore bases. The iron ores concentrated in the Krivoy Rog basin are marked by a high iron content, chemical purityand and considerable reserves.

The rich iron ores of the Krivoy Rog basin go to the steel plants of the South and Center and part of them is even exported to neighboring people's democracies.

It has been established that there is a high degree of mineralization at depths of over 1,500 m., which still further enlarges the prospects of the Krivoy Rog region. The seven-year plan provides for increasing iron-ore production in the Ukraine to 80 million tons in 1965(an increase of 60% over 1958).

New deposits of iron ores and iron quartzites have been discovered in the region of Kremenchug (explored reserves 5.5 billion tons), in Kirovograd Oblast, which together with the Kerch' deposits of limonite (about 2 billion tons) will provide the Soviet steel industry with raw-material supplies for many decades.

Within the Ukrainian SSR are two large manganese basins, the Nikopol' and the Bol'shoy Tokmak (P . Ya. Antropov. Perspektivy osvoyeniya prirodnykh bogatstv SSSR (Prospects of the Exploitation of the Natural Resources of the USSR). Gosplanizdat, Moscow, 1959, p. 49), possessing high-grade manganese ores and considerable reserves, fully satisfying the demands of the national economy.

The bulk of the manganese ores is used by industry after concentration. The seven-year plan provides for an increase of 2.1 times in the mining of manganese ores in the Nikopol' region.

Major economic significance is attached to the deposits of titanium ores of the placer type. In explored titanium reserves the Ukrainian SSR holds second place in the USSR (P. Ya. Antropov. Perspektivy osvoyeniya prirodnykh bogatstv SSSR (Prospects of the Exploitation of the Natural Resources of the USSR). Gosplanizdat, Moscow, 1959, p.53). In the central part of the Donbas, in the area of Nikitovka, there is a deposit of mercury of national significance.

Mercury has been discovered in the Ukraine in the form of cinnabar, and a number of deposits of the metallic group of minerals have been found. These include deposits of aluminum and nickel ores. The Ukraine possesses large deposits of coal. It has one of the biggest coal basins in the Soviet Union, the Donets Basin. Bituminous coal has been discovered in the Ukrainian SSR in the western and northwestern margins of the Donbas -- in the Dnepropetrovsk, Khar'kov, Lugansk and other oblasts.

The total geologic coal reserves of the Donbas to a depth of 1800 m. are 240 billion tons. About 175 billion tons of these lie between the surface and the depth of actual exploitation (1200 m.). It should be taken into account that about 50 billion tons are in the western and northern parts of the Donbas, which have not yet been exploited by industry. The reserves of the exploited part of the basin are about 90 billion tons. In the western oblasts, a new coal basin, the L'vov-Volhynian, has been discovered, explored and is now being developed.

In addition to bituminous coal, Ukrainian SSR is rich in deposits of brown coal of Quaternary age.

Of great economic significance in the Ukrainian SSR are the deposits of petroleum and natural gas in the Carpathian foothills and in the Dnieper-Donets depression. On the whole, the Ukrainian SSR contains considerable industrial deposits of petroleum and gas.

The deposits of the metallic group of minerals are widely distributed in the Ukraine, in all its geologic structures. The Ukraine possesses especially large deposits of minerals used in the chemical, metallurgical, refractory-material, china-and-pottery and building industries.

The Ukrainian SSR has large salt resources (including potassium salts), which are being extensively worked in the Donets Basin, in the foothills of the Carpathians and in Transcarpathia. Deposits of rock salt have been discovered in the Dnieper-Donets depression in the Poltava, Sumy and other oblasts amid Lower Paleozoic deposits.

On the shores of the Sea of Azov and the Black Sea, deposits of salt containing potassium, magnesium, bromine and other important elements have been studied in the limans (lagoons) and the Sivash.

Among other chemical minerals are phosphorites, iron pyrites, gypsum, mineral pigments and glauconite sands, distributed in a number of oblasts of the Ukrainian SSR. The Ukraine furnishes 80% of the kaolin produced in the USSR. The main deposits of primary and secondary kaolins are those of Prosyanaya, Glukhovets, Dubrovka and Pologi. The republic possesses large deposits of kaolin and refractory clay. Of great significance is the Chasov Yar refractory-clay deposit in the Donbas and the largest bentonite-clay deposit of the USSR in Cherkassy Oblast.

In the gneisses of the Ukrainian Crystalline Shield, deposits of scaly graphite are widespread (regions of the Bug River, Krivoy Rog and the Sea of Azov). The Ukrainian SSR is also rich in carbonate raw materials in the form of limestone, dolomite, chalk and marl. A large, high-grade deposit of metallurgical limestone and dolomite is concentrated among the Paleozoic and Mesozoic Cenozoic deposits of the Donets Basin, the Crimea and the south and southwest of the Ukrainian SSR. They serve as raw materials for the development of metallurgy and the building and cement

industries; certain varieties are processed for the sugar industry and road construction.

The Ukraine is exceptionally rich in building stone. The Ukrainian Crystalline Shield includes deposits of decorative and facing materials in the variously colored granites, labradorites, gabbro rocks, diabases, marbles, quartzites, jaspers, etc. The Ukraine possesses large deposits of volcanic rocks that serve as raw materials for the development of the stone-casting industry.

To satisfy the needs of the building industry and coarse ceramics, the Ukraine possesses immense reserves of mineral raw materials in the form of loess, loesslike loam, red-brown and variegated clays, clays of the Kiev stage, etc. This raw material is widely used in the brick, cinder-block and tile industry. Especially deserving of attention as building materials are the loesses and loesslike loams over considerable expanses of the left-bank and southern Ukraine, where building-stone materials are lacking. We have made the first attempt to classify the loesses and loesslike loams of the Ukrainian SSR by their degree of suitability as raw materials for building and have shown this classification on the map that represents a forecast of building materials sites in Quaternary deposits of the Ukrainian SSR (brick and tile raw materials) at a scale of 1:2,000,000.

Of significance for building purposes (for railroad embankments, improved graded dirt roads, etc.) are ballast materials; these include pebble, sand-and-pebble and sand alluvial deposits in river valleys, eluvium from bedrock, sand-and-shell deposits of sea beaches, spits and bars, glacial and fluvioglacial deposits. The richest sand-and-pebble deposits are distributed in the river valleys of the region of the Sea of Azov (Kal'mius, Kal'chik), as well as in the basin of the Dniester River (especially in the Carpathian Foreland.) Among the non-metallics, the Ukrainian SSR is rich in deposits of glass sands, found both in Quaternary and in pre-Quaternary deposits. Sands suitable for glass production are widely distributed through the Poles'ye and in the river valleys of the Ukrainian SSR. The distribution of the sands of Quaternary age is shown on the geologic map of the Quaternary deposits of the Ukrainian SSR.

It must be emphasized that the sands of pre-Quaternary and Quaternay age can be used and are used in many cases also as molding material in the metallurgical industry.

The Ukrainian SSR also contains fertilizer minerals of Quaternary age, among which are lacustrine limestones, limestone tuffs, etc. The marl loesses and loesslike loams can also be used for loess fertilizing of the podsol soils of the Poles'ye.

The present peat bogs widely distributed in the Ukraine, especially in the northern areas, are used for fuel.

Among the minerals of Quaternary age are also the mineral salts and muds of the salt lakes and limans (lagoons) of the south of the Ukraine, in the regions of the Black Sea and the Sea of Azov. The reserves are fairly large. Especially rich in chemical raw materials are the brine of the Sivash and the Crimean salt lakes, used for the chemical and food industries, and bottom-mud deposits used for curative purposes in sanatoriums.

The metallics of Quaternary age include: 1) the bog ores and the related ochre deposits, 2) il'menite placers, 3) placers of zirconium and other ores. All these mineral deposits on the territory of the Ukrainian SSR are being worked and utilized in the national economy.

The above data show that the Ukraine is rich in minerals of economic significance. On its territory are located deposits of coal, iron, mineral salts, sulfur, manganese, titanium, natural gas, stone and unconsolidated building materials, which have entered widely into Socialist construction.

The Climatic Resources of the Ukrainian SSR and Their Utilization in the National Economy

The main features of the climate of the Ukraine are due to the comparatively southerly location of the republic and the characteristics of the atmospheric circulation reflecting the influence of the Atlantic Ocean, the Mediterranean and the continent. The level expanses enable the air masses to move freely in any direction. Arctic invasions reach the southern borders of the republic, the Carpathians and the Crimean mountains, but the Black Sea and the Sea of Azov also introduce perceptible changes, though only in the climate of the adjacent regions.

Moreover, the territory of the Ukraine, lying amid a vast land surface, heating up in summer and chilling off in winter, is itself an important climate-forming factor.

A distinctive characteristic of the climate of the Ukraine is the great fluctuation in weather conditions from year to year. In addition to humid years, sharply dry years are possible, the probability increasing toward the southeast and south. The increase in aridity is determined not only by the decrease of precipitation from northwest to southeast, but also by the simultaneous rise of the temperature in the growing season, which increases the gap between precipitation and evaporability. Several post-war droughts have affected the economics of Soviet agriculture. There was a considerable loss of winter grains as a result of the unfavorable meteorologic conditions in the winter of 1955-56. The climatic factors of heat and moisture and their interrelationships have a decisive significance for the harvest in the Ukraine. A high degree of agrotechnology evens out to a considerable degree the differences in the yield in dry and wet years, but does not completely eliminate them.

The degree of dryness of a climate is determined not only by the amount

of precipitation, but also by the temperature, which governs evaporability. Using as a basis the relationship between precipitation and evaporability, we have regionalized the Ukrainian SSR by degrees of moisture, distinguishing five moisture zones: 1. the mountain zone, with excessive moisture 2. the northwestern zone, with sufficient moisture, 3. the central zone, with unstable moisture 4. the southern zone, with insufficient moisture 5. the arid coastal zone.

A comparison of the moisture zones with the physical-geographical zones has shown general coincidence except for small deviations.

In view of the considerable diversity of climatic resources of the Ukrainian SSR, we will examine their characteristics by natural zones, with the exception of the regions of vertical zonality.

The climate of the Poles'ye is characterized by lesser continentality than the other zones of the Ukrainian SSR (with the exception of Transcarpathia) and by sufficient moisture: a temperate, warm, sometimes hot summer, a comparatively mild winter. The high humidity produces favorable conditions for the development of fungus diseases. Under the conditions of the Poles'ye the heat factor hampers to a certain extent the introduction of more heat-demanding crops, such as corn, the most productive varieties of which do not ripen into grain. The Poles'ye has optimal conditions for potatoes by comparison with the other zones of the Ukraine, and, with a mean July temperature of 18^{0}, the best conditions for the growing of flax for fiber. In sugar-beet cultivation the Poles'ye is inferior to the forest-steppe, but has the advantage over the steppe in having a more stable harvest. A stable crop of medium-early, more productive corn varieties is basically possible here for silage, but in some years corn may yield dry grain.

The zone of sufficient moisture also comprises the Transcarpathian Oblast and the Carpathian Foreland (up to an altitude of 450 m.) with a higher temperature level. These regions, especially the former, are marked by the most favorable combinations of heat and moisture, insuring high yields of almost all leading crops, including corn.

The forest-steppe of the Ukraine has more favorable climatic characteristics than the remainder of the forest-steppe zone of the Soviet Union.

The forest-steppe (especially the central and eastern parts) lies in the zone of unstable moisture. In some years precipitation does not exceed 300-350 mm., i.e., the amount observed in the arid zone of the Ukrainian SSR. There may be no rain for 115 days, as happened in Poltava in 1934. But the moisture deficit still stands at a comparatively higher level of heat and moisture supply than in the more easterly parts of this zone. The forest-steppe, especially its right-bank part, is most favorable for the cultivation of sugar beets. The potato harvests are somewhat reduced by lack of moisture. According to the data of S. A. Sapozhnikova, the climatic conditions here are optimal for the cultivation

of medium-early varieties of corn for ensilage at the milky-waxy maturity stage, and in 50 to 90% of the years it is possible for it to reach full maturity (for dry grain). Agrotechnical measures should be directed toward the most complete utilization of the comparatively limited moisture resources.

The territory of the steppe is marked by a favorable combination of soil and climate conditions. The lengthy growing period, rich in solar heat, contributes to obtaining on large areas high yields of winter wheat, corn, sunflower seeds, grapes, melons and other crops. But the droughts, dry winds and dust storms frequently recurring in the steppe zone lower the yield and make it unstable. In the southern steppe every second year is droughty on the average.

Two areas with a high number of dry winds are distinguished in the Ukraine. The first occupies the southern oblasts with its center in the area of Askaniya-Nova; the second, the east of the Ukrainian SSR, with its center in the area of Lugansk. In these areas the mean annual number of days with dry winds is 15 to 24; in some years there are 50 to 60 such days.

The steppe zone is the most favorable for the cultivation of corn for dry grain. In the southern steppe the gap between the abundance of solar heat and the scantiness of the precipitation is sharply pronounced, which fact makes irrigation especially effective here. The mild winter, in combination with the abundance of solar radiation in the summer period, creates the most favorable conditions for grape and fruit growing. This abundance of solar heat insures the growth of varieties of wheat of excellent milling quality.

Throughout the territory of the Ukrainian SSR (except the mountains) aftermath sowings are possible after the harvesting of the early spring and winter crops, for instance, green manure (annually in the zones with sufficient moisture, in wet years in the other zones, or annually in case of irrigation). In areas with sufficient moisture, aftermath sowings must play a big role in the raising of farm productivity, as well as the productivity of animal husbandry.

In wealth of climatic resources the Ukrainian SSR occupies one of the first places in the USSR, making it possible to obtain high yields at low cost. Hence, capital investments in major reclamation measures (drainage of the Poles'ye and irrigation of the south of the Ukrainian SSR), based on climatic advantages, are effective here.

The Ukraine's climatic resources also permit high yields of fruit, vegetable and industrial crops to be obtained; hence the expansion of the areas sown to these crops is to be recommended.

Among the meteorologic phenomena harmful to the economy of the Ukraine, we shall examine glaze frost, snowstorms and fogs.

The geographic distribution of glaze frost is extremely irregular. Least

subject to glaze frost in the Ukraine are the regions situated in the lowlands, where the mean number of days with glaze frost per year does not exceed 5 to 10. Then come the Volhynian-Podolian and Dnieper Uplands (with 10 to 20 days of glaze frost). Most subject are the Donets Ridge and the Azov Uplands. Here the average recurrence of glaze frost is 20 to 40 days; the maximum thickness of glaze frost is 60 to 80 mm. This area is classified as high in glaze frost in the USSR.

The damage done by snowstorms may be judged from the following example. In the snowstorm period of February 12-24, 1956, over 122,000 men and about 300 snow plows worked to combat snow drifts on the Donets Railroad alone. The most dangerous snowstorms are connected with the northeasterly movement of Black Sea cyclones. Their progress is usually accompanied by strong northeasterly winds with a stable air temperature below freezing. The average number of days with snowstorms per year ranges from one (Yalta) to 22 (Volnovakha).

The distribution of fogs, as well as glaze frost and snowstorms, is largely dependent upon the altitude of the locality. Fogs are most frequent on the Donets Ridge. This is a region where fog occurs almost every other day in winter. In Stalino, an average of 115 days per year with fog has been recorded. Fogs are especially rare on the south coast of the Crimea (Yalta, 15 days).

The Ukraine's climatic resources are widely utilized for therapy and recreation. The mild climate of the south coast of the Crimea, in conjunction with the sea and the abundance of sun and greenery, make it one of the best health-resort regions in the country.

The mild, moderately warm climate, the presence of mineral springs, the colorful mountain scenery, covered with forests, rivers and waterfalls, also create favorable conditions for the development of health resorts in the Ukrainian Carpathians.

The Water Resources of the Ukrainian SSR and Their Utilization (rivers, lakes and swamps)

The water resources of the Ukrainian SSR -- rivers, lakes and swamps -- are relatively poor, but their significance in the natural processes and in the country's economy is great.

The rivers hold first place with respect to size and significance in the natural processes and the national economy. The Ukraine has more than 22,000 rivers, of which 2,600 are over 10 km. in length, and 117 rivers with a length of more than 100 km. The largest river systems are those of the Dnieper, Dniester, Danube, Southern Bug, Northern Donets and Western Bug. The highest density of river network is observed in the basins of the Tisza (Transcarpathia) and Prut, where it reaches 1 km.

per sq. km. and even somewhat more. In the forest zone of the Ukrainian SSR it is 0.25 to 0.35 km. per sq. km. Toward the south the density of the river network gradually declines and in the region between the Dnieper and the Sea of Azov it is near zero. Depending upon the local physical-geographic conditions the rivers of the Ukrainian SSR differ greatly in fall, slope, character of valley and channel, depths and velocities of current and, accordingly, the type of economic utilization. In the mountain regions of the Carpathians and the Crimea the fall in small sections is 60 to 70 meters per kilometer, velocities of the order of 3 to 5 m./sec., and at high water a yearly average of 1 to 2 m./sec. The valleys are narrow and deep, the channels often encumbered with stones and fragments of rock. Rapids and waterfalls occur.

Most of the rivers of the Ukrainian SSR are of the plains type, with mature terraced valleys, well developed floodplains, gently sloping shores, a fall of 2 to 10 m./km. with velocities usually 0.2 to 0.5 m./sec., increasing to 1.0 m./sec. or more at high water. Closely resembling the mountain streams are the sections of the plains rivers at places where crystalline rocks crop out (Sluch', Uzh, Teterev, Ros', Gornyy Tikich Rivers) and in the area of the Donets Ridge.

In keeping with the above-described geography of the river network of the Ukraine, its water resources are characterized by sharp quantitative changes over the country's territory. The average annual runoff module over the entire Ukrainian SSR varies from 26 liters per sec. from 1 sq. kilometer, in the mountainous part of Transcarpathia, and 4 liters/sec. in the northern part of the right bank of the Dnieper, to 0.5 liters/sec. and even less in the extreme south of the Ukraine and in the steppe zone of the Crimea.

On the yearly average, about 50 cu. km. of water run off from the territory of the Ukraine into the Black, Azov and Baltic Seas, which amounts to approximately 1.3% of the total runoff from the entire Soviet Union.

The stream flow fluctuates greatly over time. For example, the annual stream flow of the Dnieper at Kiev for many years has fluctuated between 72 and 19 cu. km. The spring flow of the Dnieper at Lotsmanskaya Kamenka in a year of high water (1931) amounted to 52 cu. km., the lowest spring flow being 10 cu. km. The discharge per second of the Dnieper River at Lotsmanskaya Kamenka has varied from 25,000 cu. m./sec. to 150 cu. m./sec. The peculiarities in the geography of the water resources of the Ukrainian SSR, in conjunction with the specific features of the natural economy, cause sharp differences in their utilization in different parts of the country.

River transportation is concentrated on the major waterways -- the Dnieper, Desna, Pripet, lower course of the Southern Bug, middle part of the Northern Donets -- and on certain, principally lowland sections of the middle tributaries of the Dnieper and Pripet. The total length of the exploited navigable waterways in 1955 was 5,400 km., approximately

3.5% of the total length of the river network of the Ukrainian SSR, with an annual freight turnover of 3.2 billion ton-kilometers compared with 1940 indices of 3,300 km. and 1.1 billion ton-kilometers, respectively. The potential resources of hydro-energy in the rivers of the Ukraine are estimated at 5,046,000 kw. with a power output of 44.2 billion kilowatt-hours, which amounts to 1.5% of the total water-power resources of the USSR (According to A. N. Voznesenskiy's paper on "The Hydro-Energy Resources of the USSR and Prospects for Utilization," Trudy III Vsesoyuzn. gidrol. s"yezda (Transactions of the Third All-Union Hydrological Congress), Vol.I 1958. However, these figures are apparently too high. The potential reserves of hydro-energy do not exceed 4.0 million kw.). The Dnieper river has the largest reserves of hydro-energy— up to 2.3 million kw. on the Kiev-Kherson section.

On the small rivers of the Ukraine (not counting the Dnieper, Pripet, Desna, lower section of the Southern Bug, and also leaving out the Crimea), the potential reserves have been estimated by the Hydrometeorological Service of the Ukrainian SSR at 726,000 kw., of which as much as 40% is concentrated in the region of the Carpathians.

The state of utilization of hydro-energy in the economy of the Ukrainian SSR is characterized by its powerful growth during the years of Soviet rule, with an interruption during World War II. The following amounts of hydro-energy have been produced, in millions of kilowatt-hours:

1913	1940	1945	1950	1955
3	2250	27	2460	3224

or in percentages of the total output of electric energy in the republic:

0.5	188	0.9	13	11

The largest hydroelectric stations are:

Dnieper station named for V. I. Lenin	650,000 kw.
Kakhovka station on the Dnieper	312,000 kw.
Tereblya-Rika station in Transcarpathia	27,000 kw.

(The Kremenchug station on the Dnieper with 625,000 kw. was completed to full capacity in November, 1960— Editor, S.G.).

The total number of rural hydroelectric stations was 929 in 1951 and 814 in 1955 (about 11% of the total number of all rural electric stations), with a capacity of about 59,000 kw. and a total electric-power output of 107.1 million kw.-hrs.

The water resources of the Ukraine are being intensively utilized in agricultural reclamation. Irrigation is mainly concentrated in the south of the Ukraine. In 1955, the land area with irrigation was about 220,000 ha. (0.6% of the entire cultivated land of the Ukrainian SSR). The

largest irrigation system is the Verkhniy Ingulets system. Land drainage is being done mainly in the Poles'ye.

In the field of water supply, the widest exploitation of water resources is being made in the Donbas, where, in addition to regulating and utilizing all the local river waters, the Northern Donets - Donbas Canal, 125 km. long, has been created. Rivers supply water to a number of towns and cities, including Kiev.

There are relatively few lakes in the Ukraine. In the valleys of the big rivers and in the Poles'ye floodplain lakes are rather numerous, but small. Here and there in the northern part of the Right Bank one encounters basin lakes, for example, Lake Svityaz', the largest, in Volyn' Oblast, with an area of 27.5 sq. km.

Characteristic is the liman (lagoon) groups of lakes, situated along the shores of the Black and Azov Seas, representing either river mouths drowned as a result of epeirogenic sinking of the seashore (the Dniester and Dnieper-Bug Limans) or closed bodies of water formed from the mouths of rivers cut off from the sea by sandspits. These are the Kuyal'nik and Khadzhibey Limans, Lakes Tiligul'skoye, Molochnoye, etc. More than fifty salt lakes with a total area of 600 sq. km. are found in the steppe part of the Crimea. A large part of them are of marine origin. Some of them -- the Kerch' koli (sinks) -- are of continental origin. The waters of these Crimean lakes are heavily mineralized. Many mineral lakes of the Ukraine are used for medicinal purposes.

Over 25,000 ponds and reservoirs are found on the territory of the Ukrainian SSR. The largest reservoirs are the Kakhovka Reservoir, with a volume of 19 cu. km. (useful volume 14 cu. km.) and Lake Lenin (formed by the Dnieper hydroelectric station), 3 cu. km. The Kremenchug Reservoir, largest in the Ukrainian SSR, is filling up. Numerous ponds are used by the population for domestic needs.

Lakes, reservoirs and ponds are of great significance for the creation of a highly developed fishing economy. The average fish catch from ponds, according to the testimony of V. A. Movchan, may be 2 to 3 million centners.

The swamp area of the Ukrainian SSR amounts to about 19,000 sq. km. Swamps are most widespread in Ukrainian Poles'ye (16.4% of its territory). They are principally of the lowland type. A great deal of work is now being done in draining and exploiting swamps.

The seven-year plan of development of the national economy of the Ukrainian SSR provides for the further extensive utilization of the water resources of the republic. The completion of the Kremenchug Hydroelectric Station and the construction of the Kiev and Kanev stations will complete the creation of a series of hydroelectric stations from Kiev to the mouth of the Dnieper. With a waterpower output of over 1,500,000 kw. it will convert the Dnieper throughout its length from Kiev to Kherson into a deep-water navigation route.

The Wild-Plant Resources of the Ukrainian SSR and Their Utilization for the Requirements of the National Economy

The Ukrainian SSR is rich in useful wild plants, especially food, medicinal, essential-oil, oil, feed, tanning, honey-bearing and fiber plants. Some of them have already been introduced into production; others are only being studied.

Many valuable food plants grow naturally in the Ukraine: fruit and nut plants, lettuce, spinach and mushrooms. It may be pointed out that two kinds of apples, the woods apple and the early apple, pears and hazelnuts are common in the woods; also cherries and cornel in the Right-Bank forest-steppe and in the Crimea. Furthermore, there are many berries, especially in the Carpathians and the Poles'ye: the raspberry, black currant, strawberry, blackberry, bilberry, etc.

Many valuable medicinal plants grow in the Ukraine. Chief among these are: valerian, the source of a sedative; belladonna, in the Carpathians and Crimea only, the source of a preparation having a pain-relieving and plasmatic action; pharmaceutical camomile, used against inflammation; adonis and lily of the valley, sources of remedies for heart diseases; the treacle mustard, a source of highly effective heart remedies; Jacob's ladder, a source of sedatives; mountain arnica, an infusion of whose leaves is a preparation stopping hemorrhages of the womb; the field ostal'nik, whose roots are used in preparing an antihemorrhagic remedy; the yellow gentian, growing in the Carpathian mountains, which is a source of bitters, etc.

The Ukrainian SSR holds in the USSR one of the first places in collections of wild medicinal plants. We have created our own chemical-pharmaceutical industry on the basis of local raw materials. Almost all the preparations that were formerly brought from abroad are now manufactured here. Medicine has been enriched by many valuable popular remedies, e.g., motherwort, everlasting cudweed and others. Many plants contain vitamins. Many essential-oil plants grow in the Ukraine, especially in the south and in the Crimea. The most valuable are: 1) Stephen's cow parsnip, growing on the south shore of the Crimea and containing as much as 7% essential oil in its fruits, comprising mainly octyl butyrate and acetate; 2) the European cow parsnip grows in the Carpathians and contains 1.5% essential oil in its fruits; 3) the stiff-haired laserwort, growing on limestone in the Crimea and sometimes on chalk in the Donets River basin in Stalino and Lugansk oblasts. Its fruits contain 1.87% essential oil, consisting 42% of geraniol, valuable for the perfume and cosmetic industries; 4) the muscatel sage, a weed in the Crimea, which yields up to 0.5% essential oil from its inflorescences, with up to 55% linaloöl and an odor resembling amber.

Much exploratory work has been done in the Ukrainian SSR in the study of wild essential-oil plants suitable for scenting soap. The samples of plants collected have been tested and approved by the Perfume Council at the

Krasnaya Zarya factory in Moscow. The most interesting have proved to be the sweet flag, the mountain brimstonewort, the sticky orach, various species of thyme, the chalk hyssop and the saltwortlike wormwood, a valuable perfume fixative. Wild oil plants are divided into industrial and food plants according to the manner of their use. In the Ukrainian SSR 20 kinds of main oil plants are grown, as well as 10 on a limited scale. Most deserving of attention among the wild oil plants are Patrin's horehound, containing 34 to 42% oil in its seeds; the wartweed and the flat-leafed spurge, both containing 33% oil in their seeds; and also the common blueweed, containing 28% oil in its seed. The oils of these plants are very valuable, quick-drying and suitable for the manufacture of high-grade varnishes, paints and drying oil. Other valuable wild oil plants are the showy hemp nettle, with 44% fatty oil in its seed, which is used in technology; and the field pennycress, the seeds of which contain 33% non-drying fatty oil, which is suited for eating, burning, lubricating machines and use in the soap-making industry.

Tanning plants are used in the extract and leather industries. The main raw material for the industry in the Ukrainian SSR is the wood of the oak, which contains 5.5% pure tannins. The waste from the processing of commercial grades of oak wood --firewood and fine waste --is used for this purpose. The bark of willows, the glutinous alder and the fir is also used. Considerable quantities of leaves of the smoke tree are used, which contain 16 to 25% tannins. There are many smoke trees in the Crimea, and a few in the oak groves along the shores of the Dniester and Bug and in the Stalino Oblast in the Artem Mountains along the Northern Donets River. The Crimea has a valuable tanning agent, tanner's sumac, the leaves of which contain 18% tannins. Other tanning agents are the sea lavenders, which grow in the south and east of the Ukrainian SSR and in the Crimea. Of the Ukrainian species, the broad-leafed sea lavender, which grows along the hems of oak woods, contains 25% tannins in its roots, while Meyer's sea lavender, growing along the seashores, contains 13 to 16% tannins in its roots. The wild tanning plants in the Ukrainian SSR cannot fully satisfy the industry's requirements and a new tanning agent is now being introduced into cultivation: the tanner's knotweed, growing wild in Soviet Central Asia.

Many valuable fodder grasses grow in the Ukraine, especially grasses and legumes, on meadows, steppes, hems of woods, various rock outcrops, salinified soils and sands.

In the forest-steppe and steppe of the Ukraine grow valuable fodder grasses. The steppes contain the grasses: fescue, wheatgrasses, meadow grasses, timothy grasses, shore brome grass and awnless brome grass, and the legumes: steppe alfalfa, esparto grasses and yellow sweet clover. The meadows contain the following grasses: foxtail grasses, timothy grasses, fescue grasses, meadow grasses, and the following legumes: clovers, alfalfas, vetches and vetchings. Salinified soils (solontsy and solonchaki) bear the Russian wheatgrass, pokostnitsy, pribrezhnitsa solonchakovaya (Aeluropus littoralis), steppe alfalfa and prostrate pigweed. On the mountain

pasturelands, or yaylas, of the Crimea grow many valuable fodder herbs: fescue, steppe and meadow timothy, Schell's wild oats, meadow fescue, glomerate orchard grass, crested, medium and Pontic wheatgrass, and shore and Cappadocian brome grass, and the legumes: steppe alfalfa, meadow, Caucasian, creeping and alpine clovers, the elegant and the yayla esparto grasses and the horned and Caucasian bird's-foot trefoils. The most valuable fodder herbs on the polonina mountain pasturelands of the Carpathians are the following grasses: the red, showy and low fescues, the alpine and meadow spear-grasses, the alpine timothy and the common meadow grass, and the following legumes: creeping clover and horned bird's-foot trefoil; and the following herbs: the evergreen sedge and the mountain plantain. In general, there are many grasses in the Carpathians; there is an especially large amount of mat grass, which is of little value as fodder and infests the mountain meadows and grazing lands. It is necessary to improve the assortment of fodder herbs on the Carpathian poloniny (mountain pasturelands) and, first of all, to introduce the cultivation of valuable legumes growing on the mountain meadows of the Caucasus and Urals, especially clover, alfalfa and esparto grass.

Many valuable honey-bearing plants also grow in the Ukrainian SSR. The main ones are: lindens, buckwheat, common blueweed, sages, mints, willow herb. Among the fiber plants there should be mentioned: kendyr' (Indian hemp), wild hemps, perennial flax, cattails and willows. In the Ukraine there are very many beautiful wild plants suitable for adorning gardens and parks with greenery. Especially beautiful are the spring plants: squill, snowdrop, saffron, tulip, irises, violets, lily of the valley, primroses, etc.

In view of the fact that the great demand for many wild plants, especially those used for medicine, food, fodder and tanning, cannot be satisfied with wild growths, many must be introduced into cultivation.

In the Ukraine a large part of the lands has been plowed up and is occupied by sowings, orchards and vegetable gardens. The areas occupied by wild plants are diminishing constantly. Hence, a number of useful wild plants should be introduced into cultivation.

In the Poles'ye not only meadow clover, but also zigzag clover, as well as medicinal camomile, medicinal valerian, the azure Greek valerian, the marshmallow, the swamp cudweed and Patrin's horehound can be cultivated with success; likewise the cinnamon rose at damp places and the sand umin on sands. In the forest-steppe and steppe zones, steppe plants should be introduced into cultivation, namely, the spring adonis, the downy-flowered milk vetch, the baneberry, the gray treacle mustard and the Don esparto grass; on the chalky slopes along the Northern Donets and its tributaries, the chalk hyssop, the chalk wheatgrass and the stiff-leafed adonis; in the forests, the warty spindle tree and on the saline soils of the Sivash, the prostrate kochia, the beskil'nitsa (Atropis) and Meyer's sea lavender. Stephen's cow parsnip should be introduced into cultivation in the mountain regions of the Crimea.

In the mountains of the Crimean Yayla esparto grass should be introduced into cultivation. In the Carpathian mountains the Scotch pine and the alpine rose should be introduced to cultivation, as well as the medicinal plants, mountain arnica and the yellow shchegavka.

The Forests and Forest Resources of the Ukraine

The forest cover of the Ukraine averages 12.8%. This figure is calculated as the ratio of the sum of the areas of: (1) the lands of the state and kolkhoz forest reserves covered with forest (2) the forested part of the forest-reclamation reserves and (3) the field shelter belts, to the area of the Ukraine.

The forest cover of the Ukraine is extremely uneven. It fluctuates by geographic zones and oblasts in the following manner:

Carpathians:	36.6%	(the Transcarpathian oblast, 49.2%).
Poles'ye	23.2%	
Forest-steppe	11.3%	
Crimea	10.3%	
Steppe	3.2%	

After completion of the Ukrainian afforestation plan, the average forest cover is expected to reach 15% in 1971.

The total area of the forest reserves in the Ukraine amounts to 7,756,700 ha., of which 7,074,700 ha. are covered with forest. Almost 25% of the forest-covered area of the Goslesfond (State Forest Reserves) are represented by natural stands. The forest-covered area is distributed as follows by species (data as of January 1, 1956):

Pine	33.9%	
Fir	10.9%	coniferous (46.2%)
Spruce	1.4%	
Oak	26.2%	
Beech	8.5%	hard-leaf (41%)
Hornbeam	5.9%	
Birch	5.1%	
Alder	3.7%	soft-leaf (10.1%)
Aspen	1.3%	
Others	3.1%	

The original forest cover and the character of the distribution of the forests over the territory of the Republic are determined first of all and principally by climatic conditions. The high humidity of the climate in the Carpathians and

Poles'ye determined their once solid forest cover, with the exception of the Carpathian poloniny, which are naturally unforested alpine meadows, at least at great altitudes. The Crimean mountain system was also once solidly forested.

As one moves from west to east along the Poles'ye and forest-steppe zones, the number of tree species diminishes because of the growing continentality of the climate. The beech, the oak, the hornbeam and others drop out in succession.

As may be seen from the above data, almost half of the area of the Ukrainian forests is represented by conifers, among which first place is held by the pine, the most widespread species, furnishing valuable wood for the building, furniture and chemical industries. In second place is the oak, which together with the beech furnishes lumber for export to other union republics. As regards the balance of wood as a whole, there is a deficit in the Ukraine, inasmuch as the estimated potential annual cut in Ukrainian forests is 5 to 6 million cubic meters, whereas the demand for wood is 40 million cubic meters annually.

The main reason for this deficit lies in overlogging, which has exhausted Ukrainian forests. During the last 20 to 25 years an average of 2 to 2 1/2 normal annual harvests have been cut each year. In the current year (1959) the timber that is being cut was supposed to have been logged in 1985-86. The Ukraine is covering only 30 to 35% of its lumber requirements from its own forests; it is bringing in the rest from the neighboring union republics, and partly from the people's democracies.

As a result of overlogging, the normal relationship between the age groups in the forests has been disturbed: young stands predominate, and there is an extreme deficiency of mature and maturing, i.e., old stands of trees. At the present rate of cutting, the last mature stands will have been logged off in 5 to 7 years.

The most important task of the forest economy in the Ukraine is the preservation of the forests and the expansion of productivity. One of the most radical and rapid ways of doing this is to cultivate fast-growing species: poplar, willow, birch, larch, locust, the walnut, and others. Poplar plantings are capable of accumulating as much wood in 20 years as oak stands accumulate in 100 years. Poplar wood is capable of replacing many kinds of high-grade woods in various sectors of the national economy. The cultivation of poplar and other quick-growing species will help not only to cover the deficit, but also to preserve the soil and water-conserving forests on mountain slopes and shores of rivers, as well as the forests of the green belts of towns and cities. A decree of the Ukrainian SSR government has established a plan for creating 750,000 ha. of plantings of fast-growing species, mainly poplar, in the course of the seven-year period 1959-65.

Still, the cutting down of the forest continues at the same rate. The

Carpathian mountain forests have been placed at the disposal of the Sovnarkhozes (Regional Economic Councils), but denudation has continued. The timely warning of the newspaper Pravda (July 11, 1956) entitled "The Carpathians must stay green" has received no support in the Gosplan (State Planning Committee) of the Ukrainian SSR.

The Ukraine has no state forest preserves. The small Starosel'skiy Preserve of the Academy of Sciences of the Ukrainian SSR, with an area of 160 ha., was abolished in 1952. It should be restored and additional forest preserves should be established in the Poles'ye, the Forest-Steppe and the Carpathians, with a total area of not less than 300,000 ha., including forests with the best preserved species or such as are capable of restoring themselves in the next few decades. A separate paper for the Congress is devoted to the problem of protecting and restoring nature for the present and future generations.

The Utilization of the Animal Life of the Ukrainian SSR as Natural Resources

The wild fauna of the Ukrainian SSR is being utilized in several ways.

The reserves of wild fur-bearing animals are a substantial and economically important resource. In first place with respect to total production is the common hare: the annual catch is at present maintained at a level of about 800,000, but in the past there were years when the annual figure surpassed two million. Besides the common hare, the fox, gopher, marten, otter, fitch, etc., occupy a considerable place in professional hunting. In addition to local species of wild animals, the fur of acclimatized species has begun to acquire greater significance in recent years, namely the raccoon dog, from the Far East, and the muskrat, a North American rodent that now inhabits our water bodies.

In the next few years will evidently begin the exploitation of the beavers re-acclimatized in many regions, where they are increasing rapidly.

The animal farms of kolkhozes and state organizations play no small role in the supply of furs and skins. The animal farms raise mainly the silver fox, the nutria and the mink.

The wild fauna serves as a source not only of fur, but also of a considerable amount of meat. The yearly catch of meat-furnishing kinds of wildlife is valued at several thousand tons. The largest share falls to the common hare and wild ducks. Hoofed animals, gallinaceous fowl and snipes have thus far furnished only an insignificant part of the total catch. However, the wide breeding and acclimatizing of pheasants in the Ukrainian SSR, carried on both by state organizations and by the hunters' association (UOOR), suggest that it will be possible in the near future to make use of this valuable game bird.

Local fishes play a considerable role among the natural animal resources.

The Black Sea has 180 species of fish; the Lower Dnieper, Dniester and Danube, more than 80. Not all species are exploited by fishermen although they include valuable food fish. Among these species in the Black Sea are stavrida, bonito (Sarda sarda), anchovy, sprat, goby, plaice, sturgeon. Altogether, about 500,000 centners of fish are caught yearly in the Black Sea. In the fresh-water basins of the Ukrainian SSR, the fish of local habitat that have the greatest significance are the bream, pike, zander, roach, gustera (Blicca bjoerkna), and others. The migratory fish caught are herring, fish of the sturgeon family, rybets (Vimba vimba) and several other kinds.

A large source of fish are the kolkhoz fish-breeding ponds. Mainly carp are bred in the kolkhoz ponds; breeding of other species has thus far been insignificant and mostly of an experimental character.

Among the most essential animal resources of the republic are various animals that are the natural exterminators and enemies of farm and forest pests. There is a variety of animals, including insects living as parasites on harmful species of insects, predatory insects, various insect eaters among the vertebrates, among which the insect-eating birds stand out. By exterminating large quantities of noxious insects and rodents, these animals often replace costly and labor-consuming chemical and mechanical controls, by performing in the fields and forests the same role as the white corpuscles in the human blood. As a result, agricultural and forest crops, protected from damage by pests, yield a larger harvest and a better product.

In the fauna of the Ukrainian SSR, a negative role is played by agricultural pests. As a result of the high level of technology and the application of effective controls, many of them have been liquidated everywhere or in many regions as mass pests. There are now no longer any invasions of grasshoppers, or massive multiplications of mouselike rodents, which formerly represented a calamity for agriculture. The meadow moth, gophers and other pests have been so restricted in numbers that they now represent no serious menace to farm crops. However, certain harmful insects dangerous to agriculture still survive in masses, as for example the beet weevil, the calicoback, wireworms and others. Finding effective means of combating these pests and eliminating the damage done by them is the work of the near future.

The prospects for the development of the republic's natural animal resources are great. By increasing the female stock of fur-bearing animals and wildfowl, fur receipts at collecting points and the catch of meat-furnishing wildfowl can be increased a great deal. To restore the stock of game animals and birds it is necessary to carry out a system of measures and to revamp to a considerable degree the hunting economy of the republic. Of especial significance in this system is the establishment of a regular hunting regime that does not touch the basic reserve of producers. Also of great significance is the improvement of hunting grounds. The process of restoring the reserve of game animals may be considerably speeded by the restocking of various species of birds and animals, both local and newly acclimatized, in

hunting grounds. These measures and a clear and planned management of the whole hunting economy will undoubtedly lead to a large increase in the resources of game birds and animals. Utilization of the Black Sea and Sea-of-Azov fishes that are now underexploited and the rationalization of river fishing and pond breeding opens up prospects of increasing severalfold the fish catch throughout the republic.

Of special significance here is the increase in the catch of such underexploited fishes as the goby, sprat and others, which can be accomplished by employing more efficient catching implements, and by rationalizing and intensifying the fishery industry. The state of the fish reserves in some of the inland waters is now such that complete prohibition of fishing for some years is a priority measure here. There are broad possibilities for raising the yield of all agricultural crops by eliminating the damage caused by various pests.

THE LAND RESOURCES OF THE UKRAINE; THEIR EVALUATION AND INVENTORY METHODS

By N. B. Vernander, S. A. Skorina and A. S. Skorodumov

For successful promotion of Ukrainian agriculture it is first necessary to place it on a scientific basis and to achieve a rational, scientific utilization of every plot of land. The kolkhozes and sovkhozes of the Ukraine have since 1958 proceeded to work out plans for the management of the economy during the next 5 to 7 years. These plans must fully accord with the physical-geographic conditions of the locality and the objectives of the economy. They must provide measures insuring a sharp rise in the total output of agricultural produce and an increase in the yields per unit area. Such measures can be outlined correctly only on the basis of familiarity with the climate, relief, mother rocks, water regime, plant and soil cover of the territory, i.e., by taking into account the whole complex of the physical-geographic conditions. But it is important not only to take stock, but also to evaluate correctly the significance of each of these factors separately and the complex as a whole, i.e., to give an agricultural evaluation of the separate parts of the territory of a kolkhoz or sovkhoz. The methods of such an evaluation have still not been definitively worked out, although the main, fundamental aims have been outlined in the works of D. L. Armand, A. I. Tulupnikov, the team of authors of the Soil Institute named for Dokuchayev (N. N. Rozov, S. S. Sobolev, Ye. N. Ivanova and others), M. A. Glazovskaya, K. V. Zvorykina, and others.

The compilation of plans for land organization and the management of the economy must be preceded by a detailed and integrated physical-geographic exploration of the territory with compilation of so-called integrated agricultural maps. Such maps may either be single or consist of a series of separate maps on relief, soil-forming rocks, level of ground waters, soil cover, vegetation, etc. However, all these features must have an agricultural interpretation. Otherwise, they will not be intelligible to the practical workers on the spot

and, consequently, will not be used. These documents must also be the basis for a qualitative and quantitative cadaster of the lands of the larger territories (rayons, oblasts, republics). The work of compiling such maps is only just beginning, yet today there is already a need for an inventory of the land reserves of the Union and its administrative subdivisions. At the present moment a land inventory is being made mainly on the basis of soil maps, chiefly at a small scale, and only in individual farms is it being made on the basis of large-scale surveys. Although the soil maps do not fully reflect the whole complex of physical-geographic conditions, the basic factors of the natural environment do affect the formation of the soil cover and thus are reflected through it. Hence, by using them and supplementing them with relief indices, one can with greater or lesser approximation inventory the amount of land of different qualities on the territory of a given farm, rayon, oblast, republic, etc.

Attempts at taking quantitative and qualitative inventory of lands have been made repeatedly on the territory of the Ukraine. The inventory methods have consisted in the compilation of legends explaining soils on maps of different scales.

A start was made in this work in 1932, when large-scale soil maps were compiled for 25 rayons of the Ukraine.

The rayons investigated were scattered over the whole territory of the Poles'ye and the Forest-Steppe Zone and did not constitute a continuous area. The areas were estimated with a planimeter or transparent graph paper. It was significant because it showed the mean relationship between the areas of different soils in the given zones. The great defect of this work was that in estimating the areas no account was taken of the area of different types of lands. It is quite understandable that the data obtained could not satisfy agricultural production, since the character of land use remained unclear, the new reserves of tilled land were not distinguished, and no data were obtained for judging the rationality of the use of a territory, and so forth.

In 1934-35, 96 machine-tractor stations (MTS) of the beet-sowing zone in the Ukraine were investigated on the basis of large-scale maps. In spite of the fact that the MTS soil maps were compiled on the basis of kolkhoz land-organization maps, where the various types of lands were entered, the areas here were also estimated by soil varieties and their mechanical composition without taking into account their distribution over various types of lands. Thus, the same error was committed as in the 1932 work.

In 1940, the Ukrainian Institute of Agriculture proceeded to compile soil maps of the western oblasts newly incorporated in the Ukrainian SSR. The maps were compiled at a medium scale and showed the boundaries of the main types of agricultural lands. In composing the explanatory legends for the maps, the areas were estimated by four types of lands: plowlands, forests, hayfields, common pasturelands. However, there were at that time

no similar data for other oblasts and hence it was still impossible to make a general estimate of the land types for the whole Ukraine.

A general estimate of the areas throughout the Ukraine was first made in 1947-48 in connection with the publication of the soil map of the Ukrainian SSR.

However, the absence from the original data (except for the western oblasts) of the designations of land types prevented a differentiation of the soils by land types, which greatly reduced the value of the general inventory of the soil reserves over the whole territory of the republic. Still, it furnished an interesting and important picture.

It has been ascertained that the main area of the Ukraine is covered with chernozems, mostly in slightly or moderately dissected plains. A considerable area is made up of podsolized chernozems and dark-gray forest soils. Thus, the most fertile soils, which are to be assigned to the first category of plowlands by the classification of the Dokuchayev Soil Institute, occupy 45% of the entire area of the Ukraine. (On these soils it is possible to obtain fairly high and stable yields from year to year even with average agricultural techniques.).

Considerable territories are made up of the second category of plowlands. They include: the gray and light-gray forest soils, the brown forest soils of the lower tier of mountains, the southern chernozems, the dark-chestnut weak solonets soils, the turfy, slightly or moderately podsolic light-loam and sandy-loam soils, the turfy, meadow and certain other soils. Altogether, they occupy about 23% of the Ukraine. To obtain high yields on these soils special techniques must be applied. On the southern chernozems, dark-chestnut soils and their solonets varieties measures are necessary for the accumulation and retention of moisture. On the dark-chestnut weak-solonets soils, the application of gypsum during sowing also produces a marked effect. On gray, light-gray or turfy podsol soils, the application of organic and mineral fertilizers, as well as lime, should not be omitted.

Smaller areas are occupied by the third category of plowlands, to which must be assigned, on the Ukrainian scale: the turfy podsolic clay-sand soils of all degrees of podsolization, their gleyish and gley varieties, the turfy podsolic superficially gleyized soils of the northeast of the Carpathian foreland, the chestnut soils in combination with solontsy in amounts less than 20%, the turfy carbonate soils (rendzinas), the brown forest soils of the middle and upper tier of the mountains and certain others. Their total area amounts to about 16%. These soils are in general of low productivity. To obtain high and stable yields a whole complex of techniques must be applied: systematic application of organic and mineral fertilizers to the turfy-podsol clay-sand soils and their gleyized varieties; employment of mole drainage and the cultivation of perennial grasses on the turfy-podsol soils of the Carpathian Foreland; the gypsuming of solontsy in the chestnut zone; the liming of brown forest soils, etc.

The fourth category, soils difficult to develop, comprises about 6% of the territory of the Ukrainian SSR. It includes the turfy-podsol sand soils; the thin-layered turfy-carbonate varieties; the rubbly chernozems on the products of weathering of hard rocks, the heavily gleyized varieties of all soils; the chestnut soils in combination with solontsy, which occupy from 20 to 30% of the territory; expanses of meadow solontsy, peat-bog soils and peat bogs of the lowland type. To develop them, radical reclamation measures are required: the creation of organic interlayers in the sandy soils, the deepening of the friable layer in soils formed on the products of weathering of solid rocks, the gypsuming and irrigating of the solontsy, the draining of the swamp soils, and so forth.

Finally, the area of soils of the fifth category (unsuited for tilling) is insignificant. It includes the sands that have been broken up and are being blown away, the silty swamp soils, the upland and transitional swamps, the complexes of chestnut soils with solontsy amounting to 30%, as well as the seaside solonchaki.

These estimates were incomplete because they were made from a small-scale map and without dividing the soils according to land types. Especially inaccurate was the inventory taken of the area of natural fodder lands, situated along the bottoms of gulches and small river valleys. The latter, because of their narrow width, have often not fitted into the map scale and have escaped being taken into account. Highly approximate and underrated is the area of swamps, situated principally in small sections amid the podsol soils of the Poles'ye and hence included in their contours. The area of eroded lands has not been inventoried, since the washed-off soils were not distinguished clearly enough on the map and, moreover, they too are situated, as a rule, in narrow strips along the gulches and ravines and do not fit into the map scale. Thus, the qualitative inventory of the lands in the Ukraine, made on the basis of the soil map, has given only a general idea of the relationship between areas of different fertility and has not permitted the drawing of practical conclusions for the planning organizations.

In 1947-48 there arose the necessity of ascertaining the areas of soils requiring liming in the individual areas of the Poles'ye, the Forest-Steppe and the Carpathians. To realize this task, it was necessary to compare the soil maps with the composite land-organization maps of the kolkhozes and sovkhozes and to deduct from the total areas of acid soils the tracts covered by forests, the private plots, and so forth. This was the start of the inventory of the land reserves of the individual rayons of the Ukrainian SSR with distribution of the soils by types of lands. This work was done especially carefully in Khmel'nitskiy Oblast. The areas of various soils were divided between plowlands (without division by categories), forests, bush land and logged-off areas, hayfields, common pastures, orchards and vegetable gardens, and swamps. The distribution of the soils was done rather approximately, on the basis of general laws established by soil scientists in their field investigations of the given or adjacent territories. Thus, the most podsolized soils were classed under forest; the meadow chernozem soils,

under vegetable gardens, with which they are most often associated, and so forth. In spite of the rather rough approximation of the figures obtained, they were of help to agricultural organs in questions of the distribution of fertilizers, the designation of lands for liming and the selection of lands for new crops. It is only to be regretted that this work was not finished even within the Khmel'nitskiy Oblast.

A precise inventory of the soil reserves with distribution by land types was made in the zone of the Southern-Ukrainian Irrigation Canal and the Nogay Irrigation District as a result of the field investigations by the Ukrainian Institute of Farming and the Khar'kov Agricultural Institute in 1951.

Considerable work has been done in the last few years in inventorying eroded lands. Erosion in many regions of the Ukraine has assumed a catastrophic character. It is especially serious in the Middle Dnieper region (Rzhishchev, Kanev and other rayons), the Bug-Dniester divide, the shores of the Dniester and Prut in Chernovtsy Oblast, the rayons of the Donets Ridge and the outliers of the Middle Russian Uplands, the Carpathian mountain system, and so forth. Without knowing the areas of eroded soils it is impossible to draw up a precise plan of the hydrotechnical and earth-moving work necessary to combat this calamity. Such an inventory has been taken in individual rayons at different times by the Ukrainian Scientific-Research Institute of Farming, the Institute for Forests and Agro-Forest Reclamation, the Agro-Forest Planning Organization, and others. According to the approximate data of these institutions, erosion on the territory of the Ukraine embraces 10 million hectares, with 5 million hectares affected to a moderate or intense degree.

In the right-bank Forest-Steppe the eroded lands occupy the following areas (in thousand hectares): 115 in Ternopol' Oblast, 430 in Khmel'nitskiy Obl. (27 have been removed from agricultural use), 894 in Vinnitsa Obl. 500 in Kiev Obl. In the Dniester region, ravines with outcrops of mainly solid limestone have been formed over large areas. In the Peremozhets' kolkhoz in Kanev Rayon, Cherkassy Oblast, the eroded soils and ravines occupy 73% of the area. In the Bukrinskaya group of kolkhozes in Rzhishchev Rayon there are almost no uneroded soils. In the Korsun and Smely machine-tractor stations of Cherkassy Oblast the eroded soils occupy 20 to 30% of the area. In one of the field-teams of the Zhdanov Kolkhoz in Shpikov Rayon, Vinnitsa Oblast, the soils have been distributed as follows by degree of erosion in per cent: uneroded 42, slightly eroded 13, moderately eroded 19, heavily eroded 21, ravines 0.7, gulch bottoms 4.

In the left-bank part of the Ukrainian SSR, in Ponornitsa Rayon, Chernigov Oblast, the area of eroded slopes, ravines and gulches amounts to about 30% of the rayon's plowlands. According to data of the Ukrainian Scientific-Research Institute of Soil Science, the eroded soils in Volchansk, Kupyansk, Zolochev, Khar'kov, Pechenegi and other rayons of Khar'kov Oblast occupy 50 to 70% of the area, with slightly eroded soils accounting

for 40 to 50% moderately eroded 10 to 15%, and heavily eroded 5 to 10%. Especially heavily eroded are the right banks of the rivers. On the right bank and some places off the left bank of the Northern Donets River, eroded soils occupy 10 to 20% of the area. The same distribution of eroded soils is observed on the outliers of the Middle Russian Uplands in Sumy and Chernigov oblasts.

Eroded lands are widespread in the Donbas. In the region of the Donets Ridge the length of the ravine-and-gulch network reaches 0.6 to 0.9 km. per sq. km. There are data showing that in 18 adjacent rayons of Stalino and Lugansk oblasts as much as 400,000 hectares is affected by the processes of erosion, and 250,000 hectares are unsuited for agricultural use.

According to the Ukrainian Scientific-Research Institute of Soil Science, the plowland area in the Stalino Oblast was reduced from 2,367,000 ha. in 1913 to 1,724,000 ha. in 1957. From 1947 to 1956, the plowland area diminished from 1,821,000 to 1,676,000 ha. In the Staro-Beshevo rayon of this oblast the eroded soils occupy 80 to 90% of the area, with moderately eroded soils accounting for 50 to 60%.

Erosion has assumed extensive proportions in the rayons of the mountain and foothill zone of the Carpathians, where the removal of the forest cover often results in the total destruction of the soils. The same is happening in the Crimea, where the total area of eroded soils reaches to 50to 55%. To this must be added the considerable areas of soils slightly affected by erosion. These soils have already lost part of their fertility, and, unless resolute measures are taken, they will soon pass over into the moderately or heavily eroded class. Anti-erosion measures must be introduced at once, but the rayon, oblast and republic organizations thus far have no reliable data for planning such measures.

The situation is somewhat better with regard to an inventory of swamps requiring reclamation by drainage. A handbook on the swamps of the Ukraine, compiled by the Ukrainian Scientific-Research Institute of Botany, was published in 1959. It accurately gives the locations, areas and quality of swamps, with an area of more than 10 ha. and a peat depth of more than 60 cm. According to this handbook the republic has 801,500 ha. of peat bogs, of which 93.3% are bogs of the lowland type, 4% bogs of the transitional or mixed type, and 2.7% bogs of the upland type.

Thus the main swamp reserve of the Ukraine belongs to the lowland peat bogs, which are a valuable reserve of plowlands in the Poles'ye and a source of organic fertilizers in the Forest-Steppe Zone. However, even in the inventory of swamp lands, the necessary precision has not been attained. In the Poles'ye zone there is a multitude of uninventoried little swamps, with an area of 1 to 2 ha. or less. Also uninventoried are rather considerable expanses of silty-swamp soils without a peat layer. Thus, the total swamp area in the Ukraine has been considerably underrated.

The situation is also not satisfactory with regard to the inventory of the area of solonets lands and solontsy. Solontsy are not arranged in solid areas, but are scattered among the chernozems, dark-chestnut and chestnut soils, in the contours of which they are usually included. An accurate inventory of their area can be taken only by the "key" method, in which the percentage of solonets spots is taken into account in the general complex contour. A simple but sufficiently accurate method of doing this has been proposed by one of the authors of the present paper (S. A. Skorina). It consists in choosing a straight traverse 200 to 300 m. long on the ground. Following it, the investigator measures the diameter of all the solonets spots and thus establishes the percentage. Of course, this method requires three or fourfold repetition. Among the dark-chestnut soils the solontsy occupy 5 to 10% of the area; among the chestnut soils, 20 to 30% or more. The area of soils that are solonets to one degree or another has not been completely established. Also lacking is any estimate of the area of solonchaki.

A full inventory of the land reserves of the Ukrainian SSR can be made accurately only on the basis of continuous large-scale mapping and the compilation of maps and materials reflecting all the factors of the physical-geographic environment that affect the productivity of agricultural lands. These materials include soil maps, vegetation maps, topographic maps with horizontal contours and indication of the agricultural land types, and in the eroded regions also slope maps. In this sense, immense prospects are being opened up by the large-scale soil studies now being carried out in the republic. On the basis of a 1956 decree of the Council of Ministers of the Ukrainian SSR, an order of the Ministry of Agriculture was issued regarding the making of a complete soil survey of the territory of the Ukraine.

This survey was estimated to take five years, 1957 to 1961. At present, surveys have already been completed in all the western oblasts and two-thirds of the area of the remaining territory of the Ukraine has been surveyed. This work differs radically in character from the soil work done earlier. Above all, it is of an integrated character. The field parties are made up of soil scientists, pasture specialists, land organizers, agronomists, chemical analysts and cartographers. The soil scientists, in parallel with the examination of the soils, study the character of the relief, the geologic structure of the terrain, the hydrogeological characteristics, the climate and other elements of the natural complex which are reflected in the sketches issued to each kolkhoz. The soil survey itself is being made on the basis of the land-organization maps which show all the suitable land types and, in addition, the horizontal contours are entered by pantographing from the topographical maps. The latter makes it possible to tie in the soil cover entirely with the relief of the locality. Practice has shown that precisely this part of the work can be most successfully performed by people with a broad geographic education, who at the same time have a good understanding of agricultural questions. Hence, we consider it necessary, in the programs of the geography faculties, to provide for the expansion of courses in soil science and the fundamentals of agriculture.

The pasture specialists of the field parties make a detailed examination of the natural fodder lands according to the same maps, both from the genetic and the agricultural-technical point of view, drafting measures for improving them. The agronomists study the economics of the kolkhozes, their prospects for development and their economic opportunities. In certain cases they even institute field experiments on soils that have been little studied agronomically. On the basis of the data obtained, concrete measures are worked out to raise the yield of crops and to make rational use of the farm territory. The land organizers correct the maps in the field, concern themselves with the calculation of the areas and participate in the compilation of the cartograms.

On the basis of the whole complex of investigations, the following materials are issued to the kolkhozes and sovkhozes:

1. A soil map at a farm management scale in the regions of the Poles'ye, the Crimea and the mountain zone of the Carpathians and on the remainder of the Ukrainian territory. In this map the soil cover is represented in detail, the mechanical composition of the soils is entered (by symbols) and the soil-forming and underlying rocks are designated (by letters). The soil map is, as it were, the scientific foundation for all the other documents.
2. A cartogram of agricultural production soil groups. This cartogram is important for inventorying and qualitatively assessing the land reserves of a farm. It shows generalized groups of soils similar in fertility, requiring the same measures for improvement and having the same agricultural use. Essentially, the agricultural production groups represent categories of lands of different value. The text gives complete details about their quality and characteristics.
3. A cartogram of rational land use. It shows the sections that can be most rationally used in different kinds of crop rotations (grass-field, green-manure, and so forth) and for hayfields, common pastures, orchards, vegetable gardens, and so on. On the basis of this cartogram, farms can reorganize their agricultural lands for better utilization.
4. A cartogram of improvements in fodder lands, worked out concretely for each section.
5. A cartogram of eroded lands, showing areas requiring various anti-erosion measures.
6. A cartogram of agricultural reclamation works.
7. Special-purpose cartograms of liming or gypsuming of the soils, again with a concrete indication of the forms and doses of meliorative substances to be applied to the crop-rotation fields (on the basis of analytic data).
8. The text describing the natural conditions, including relief, and giving a detailed agronomic characterization of the soils and agricultural recommendations.
9. A legend classifying the soils, compiled on the basis of a computation of the areas from the soil map with the aid of a planimeter. It takes into account, all natural land types of the genetic varieties of soils based on mechanical composition and soil-forming and underlying rock. Areas of lands with various degrees of erosion, sediment deposition and cultivation, broken-up and

half-turfed sands, the spots of solontsy, and other features are accurately computed. The soil areas are also precisely tied in with the areas of land types of the land balance drawn up in the last few years.

The data of the soil inventory obtained in this manner give a full idea of the land resources of a farm, the quality of the lands and the most rational ways to use them. From this follows the possibility of accurately planning the various measures for increasing both the yield of individual crops and the total produce harvested by a farm. This work has not yet been completed. Only in the eight western oblasts have all farms been fully examined. In the rest, the work will be finished partly in 1960 (the Forest-Steppe Zone) and partly in 1961. However, it is urgently necessary even now to proceed to summarize the data, first on a rayon level and then, where possible, on an oblast level. If this is left until the work is fully completed, the summary data for the republic as a whole will not be available before 1964-65, when the acute need will have diminished to a considerable degree.

We must also proceed without delay to work out an evaluative scale of soils, which has thus far not been done in the Ukraine. We consider it a defect in the soil survey work that the estimation of the areas of soils is being done without joining them together by categories of agricultural value. As a result, the summary data obtained are too unwieldy and are not entirely concrete. It seems to us that the rayon summaries of the soil legends should not be made according to soil varieties, but by evaluative soil groups, possibly somewhat larger than the agricultural production groups distinguished on the individual farm maps. The compilation of such an evaluative scale, i.e., active concern with the question of soil quality assessment, is the most immediate task of Ukrainian soil scientists and geographers. For this work it will be necessary not only to make wide use of the data of the large-scale soil survey, but also to evolve a network of supplementary stationary studies on the most typical sections of individual physical-geographic oblasts and even rayons. Stationary studies should ascertain the main interrelations between individual factors from the viewpoint of their influence upon the quality of the lands, observe the contemporaneous processes resulting in the change of fertility of soils, and work out concrete methods of combating undesirable phenomena, particularly erosion and salinification for the different regions of the Ukraine.

Only as a result of such work will it be possible to obtain precise data on the quantity of lands of different qualities which the Ukraine possesses, and to outline scientific ways of making rational use of them.

A CANADIAN SCHOLAR'S VIEWS ON GEOGRAPHY IN CANADA AND IN THE USSR

By V. P. Kovalevskiy

(From Izvestiya Akademii Nauk SSSR, seriya geograficheskaya, 1960, No. 3, Pages 135-37)

The name of Trevor Lloyd, one of the leading Canadian geographers, is well known to the Soviet geographic community. Professor Lloyd became familiar with the work of Soviet geographic institutions during his trips to the USSR. At the annual 1958 meeting of the Canadian Association of Geographers, whose president he was in 1957-58, Professor Lloyd presented a speech titled "The Geographer as Citizen." In that speech, printed in The Canadian Geographer, No. 13, 1959, Trevor Lloyd tried to outline the principal fields in which Canadian geographers could make contributions to their country. The speech describes the present state of geography in Canada and some problems of its practical application and reflects Trevor Lloyd's impressions of Soviet geographic institutions.

Canadian geography is relatively young and has developed to a large extent under the influence of European and United States geographers. Among the geographers who have played an active part in the organization of geography departments at universities and the presentation of geography courses are the French geographers J. Brunhes and R. Blanchard, the British geographers G. H. T. Kimble and G. Tatham, and the British-Australian geographer Griffith Taylor. The youth of Canadian geography is also mentioned by Trevor Lloyd, who notes that the Canadian Association of Geographers is not yet ten years old, the senior university department of geography in Canada less than 25 years, and the Geographical Branch in Ottawa has existed only since 1947.

(The Canadian Association of Geographers was founded in 1951; previously there had been a division of the Association of American Geographers. The first geography department was founded by Griffith Taylor in Toronto in 1936. The Geographical Branch was first a division of the Ministry of Geology and Resources. In 1951 it became a branch in the new Ministry of Mines and Technical Survey. The branch is engaged in important studies, especially in northern Canada.)

It is possible that the youth of the discipline in Canada has encouraged the widespread view that "geographers should be content to confine their efforts to the classroom, the drawing office and the library, there to assemble the basic data garnered by more specialized and enterprising scientists from other disciplines." Trevor Lloyd resolutely condemns such an attitude toward geography. A large part of his speech is devoted to attempts to show that field work is not only essential for a geographer, but that (and here he refers to the field work of the Geographical Branch) by working in the field

the geographer can make his greatest contributions. The work of the Geographical Branch has resulted not only in interesting data on the physical geography of various parts of Canada, but in the realization of a number of construction projects in northern Canada.

With regard to geographic research of economic usefulness, Trevor Lloyd finds that most Canadian geographers concentrate on excessively small areas. He finds this to be true especially in economic geography. This criticism, which can be equally applied to economic geographic research in the United States, is entirely correct, in our view. The strictly utilitarian approach to geographic problems and the scattered study of small areas under contract to private concerns, chambers of commerce and city administrations is reflected in the journal articles and dissertations of American geographers. In Professor Lloyd's opinion, the emphasis on studies of small areas is largely responsible for the fact that Canadian geographers take virtually no part in the work of Royal Commissions, and studies that might well have been prepared by geographers are turned over to persons in other disciplines.

(National and provincial Royal Commissions are established to make studies of a certain problem, usually of an economic character. The study data for these commissions are prepared by various private and governmental organizations. Of great interest, for example, are the findings of a recent Royal Commission on the future of the Canadian economy. On the basis of 330 detailed reports, the commission prepared a summary report and 34 surveys of transportation, power, mining, agriculture, and so forth.)

"The newness and youth of the geographical profession in Canada is of course one reason for the modest contribution made so far, but it is not a good reason for future inactivity," Trevor Lloyd writes.

At the present time the Canadian Government, in the interest of the monopolies, is conducting considerable research in the underdeveloped parts of the country. The government is assuming the cost of transportation construction and is collecting and processing data on resources; in other words, it is preparing the soil for the advance of private capital into the new areas. The needs of the military services are playing an important part in that research. Although Canada has done a great deal in the last 10 to 15 years to develop the northern areas, that development has been largely unplanned, has lacked a single objective and has failed to take account of the integrated needs of all services. Professor Lloyd notes that basic shortcoming, as follows: "There has been, it seems to me, far too much 'individualistic' development of the northern part of Canada without due regard for the betterment of the community as a whole. Weather stations were located to meet the needs of one service rather than to serve as scientific stations for many branches of learning, trading posts were located for trading only."

Professor Lloyd feels that the participation of geographers in the study

and drafting of plans for the settling and developing of new areas would change that situation. "Here again there is, or should be, ample scope for geographers to pool their talents with administrators and with others so that the coming development of northern Canada may be reasonably orderly and may not place an unjustifiable burden on those more southerly communities which must meet the cost."

Trevor Lloyd sees the second field of activity for geographers in the schools. "The time has now arrived for us to study the situation in our schools anew and to concentrate effort on possible ways of improving it," he says. His speech notes the sharp decline in elementary geography teaching in Canada. Many children are said to be less well informed in geography than their grandparents. Geography is said to suffer not only from neglect, but also from the fact that neither the teacher nor those who teach the teachers have any idea what modern geography is. Canadian schools have no geography textbooks written by authors who are professional geographers. In many schools geography has entirely disappeared, having been absorbed into the new subject of "social studies."

"It never seemed to me that sound educational theory required one to spray young minds with a random sample of history (especially constitutional history), place-name geography, primitive economics, sociology and current events (made up largely of newspaper chit-chat), the whole spiced with a warm glow of civic virtue," Lloyd comments. The result of the introduction of that new study subject, exported from the United States, has been that "it is now almost universally agreed that the children have in fact learned little good history and less geography ... It must have been extraordinarily difficult to bring up a generation quite so devoid of elementary knowledge of the 'earth and those that dwell therein,' but the pedagogues seem to have achieved it."

Professor Lloyd suggests that the time has come to stop Canada's importation of pedagogical notions and that the social studies curriculum be the first item to be repatriated. He calls on professional geographers to take an active part in helping the schools and in raising the level of training of geography teachers.

Professor Lloyd makes it clear that he is in favor of the strengthening of international contacts between geographers of various countries. He calls on Canadian geographers to assess various political and social conditions with scientific objectivity, without preconceptions. "In this connection we need to be particularly careful to remember that all the world's sinners have not been, by some mysterious alchemy, concentrated between the Elbe River and the Shanghai Bund," he adds.

Regarding his impressions of his 1957 trip to the USSR and Eastern Europe, Lloyd recalls the warm reception he had everywhere. About Soviet geographical education, he says: "Academic standards at schools and universities are in no way below those of North America, and in some ways

are superior." Lloyd notes that geography teaching in Soviet middle schools is superior to that in Europe. He discusses in detail the training of Soviet geographers at universities. He stresses what are to him two basic advantages of the Soviet system -- the early specialization of students and the well organized field work. In fact, Lloyd appears to have been quite impressed by Soviet field-work practices: "One of the lessons we may usefully learn from the educational methods of our Soviet colleagues is the value of giving all serious students of geography first-hand personal experience in a variety of landscapes, considering the cost a normal part of the expense of a good professional education."

Lloyd comments with respect on the results of that kind of education: "The profession of geography is highly esteemed in the USSR and I came away with the impression that its members well deserved the status they have achieved. At my lectures, in many interviews, on visits to laboratories and classrooms, Soviet geographers struck me as being alert, well qualified, most anxious to keep themselves fully informed about developments in their fields abroad, and ready to let us know of the results of the projects they are themselves engaged in. Study of their many published reports reveals significant work of high quality."

At the end of his address, Trevor Lloyd expresses the hope that Canada, on the one hand, and the Soviet Union and the people's democracies, on the other, may exchange geography students, research workers, teachers and scientific literature. While acknowledging that governments must play a part in such exchanges, he calls on the Canadian Association of Geographers and Canadian universities to establish direct contacts with their counterparts in the USSR and Eastern Europe. It is hoped that Lloyd's appeal will be heeded and that businesslike contacts leading to better understanding will be developed.

BASIC SHIFTS IN THE STRUCTURE AND DISTRIBUTION OF CHINA'S INDUSTRY

By I. Kh. Ovdiyenko

(From Vestnik Moskovskogo Universiteta, seriya geografiya, 1960, No. 2, Pages 28-32)

The victory of the Socialist system in China has opened unlimited possibilities for the development of her productive forces. A characteristic feature of the structure of China's industry since 1949 has been the large percentage share of heavy industry, which has been developing most rapidly and constitutes the central link and the basis of industrialization. By 1957, the percentage share of the output of producer goods was 52 per cent (compared with 29 per cent in 1952) and the percentage share of the output of the machine-building industry doubled compared with 1952. Of the

total capital investments in industrial construction, 88.8 per cent were allocated to heavy industry and 11.2 per cent to light industry.

The principal aim of the Socialist industrialization of China is to create within about three five-year plans the basic attributes of an integrated industrial system, in which heavy industry would predominate.

The need for creating such a system is dictated by the extreme backwardness of the economy, the large size of the population, the great demand for goods and the presence of rich natural resources. In addition the creation of a diversified and powerful industry in China would assist in the economic upsurge of the entire Socialist camp. The realization of Socialist industrialization in China in the last ten years has resulted in a 11.7-fold increase in industrial output, a 27-fold increase in the output of producer goods and in major changes in the geographical distribution of China's industry. Industrial construction in China is taking place in accordance with the basic principles of the Socialist distribution of productive forces: to bring industry closer to sources of raw materials and fuel with a view to making better use of the country's natural resources, as well as closer to areas of consumption.

The first five-year plan (1953-57) laid the basis for radical changes in the distribution of productive forces. The center of gravity of industrialization was shifted to inland areas. Out of 694 major industrial projects whose construction began in the first five-year plan, 472 were situated in inland areas. As a result of this construction, industry is developing more rapidly in inland areas than in the old coastal areas.

By the end of the first five-year plan, industrial output in the coastal areas had risen by 3.2 per cent over 1952 while output in inland areas had risen by 53.9 per cent. In 1952 industrial output of the inland areas accounted for 27 per cent of the national total, and in 1956 for 31.6 per cent. By 1958 these areas accounted for more than a third of China's industrial production.

The eighth congress of the Chinese Communist party in 1956, discussing the development of industry in the second five-year plan (1958-62), ordered continued priority for the construction of industrial projects in inland areas together with active exploitation and expansion of industrial capacities in coastal areas. Consequently construction of new industrial centers in inland areas continues to be the principal element in the distribution of productive forces in the second five-year plan and a vast program of industrial construction is now taking place in the interior.

As a result 10,380 industrial projects of all sizes were under construction in the first five-year plan in the vast areas of the Northwest, once regarded as a remote region; in the large territory of the Southwest, once cut off from the rest of the country because of lack of transportation; in the Central region, also rich in natural resources; in the vast areas of Inner Mongolia and in the deserts of Sinkiang, in Tsinghai and elsewhere. By the

end of 1957, out of a total of 921 major projects, 537 had been fully or partly placed in operation. They formed the core of new industrial areas of the interior.

These areas now contain most of the country's industrial enterprises and 68 per cent of all above-limit industrial projects, completed or under construction, situated in places considered safe from the military point of view. (Above-limit projects are those in which capital investments exceed 5 million yüan or 10 million rubles.)

The new rational distribution of industry, carried out in the first decade since the establishment of the Chinese People's Republic, pointed up the general tendency of shifting industry to new areas, where industrial complexes are rising around steel centers and large hydroelectric projects.

These shifts in geographical distribution are one of the characteristics of China's industrialization. These shifts are associated with a steady expansion and consolidation of existing industry in the eastern coastal areas. This does not contradict the general policy of moving industry into the interior, but, on the contrary, insures and stimulates the location of industry in the new areas. As a result of these changes, the new economic map of China now shows rather clearly defined outlines of several industrial regions, either already formed or still in process of being formed.

The following basic industrial regions can now be distinguished in China (see map on Pages 50-51).

The Northeast Region includes the provinces of Liaoning, Kirin and Heilungkiang. It is at the present time the country's chief steel producer and the largest industrial concentration. A rather rich and diversified resource base also supports coal mining, machine building, electric power generation, chemical, timber and other industries. The area is especially rich in iron ore and building timber. It is one of China's oldest industrial regions. More than one-third of its industries date from before 1949, and two-thirds from the first and second five-year plans. The industrial heart of this region is the Anshan steel plant, which supplies steel to all major construction projects. The region produces about one-half of China's electric power, more than one-third of the coal and about 70 per cent of the pig iron. Anshan's steel output in 1958 was 4.5 million tons. The Anshan plant, with its long production experience, serves as a training center of Chinese steel workers. Through its trained specialists and its output (especially steel, machinery and timber) the Northeast is playing a major role in assisting all other regions in industrial construction.

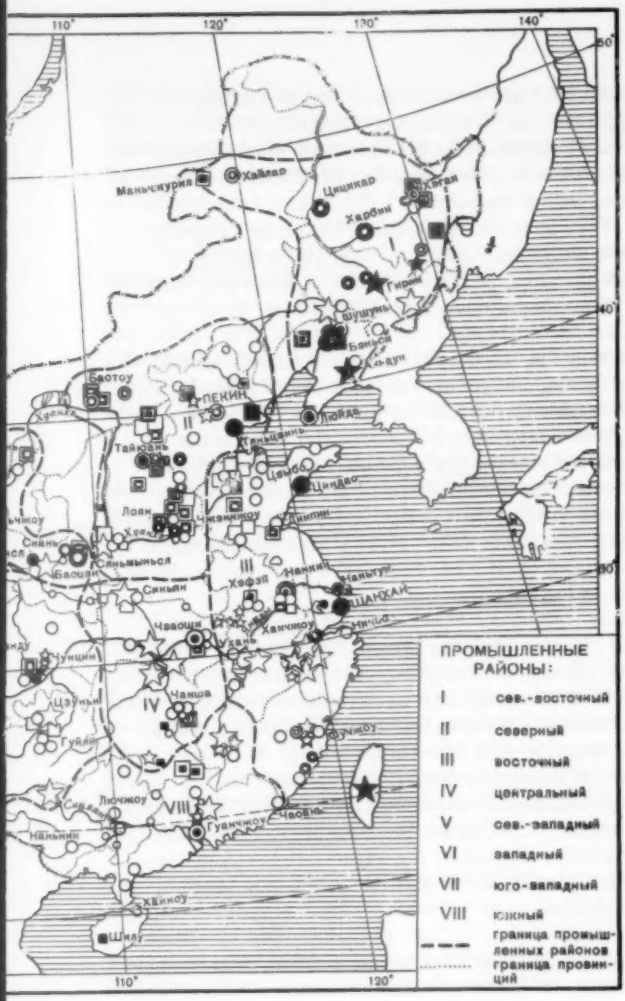
The Northern Region includes Peking and suburbs, Tientsin and other industrial centers situated in Hopei and Shansi provinces and in the Paotow area of Inner Mongolia. It is a relatively new industrial region, about 9/10 of its industrial projects dating from the first and second five-year plans. Coal and steel are the principal industries. The region is one of

Развитие и размещ

Development and location of Industry in China

Legend:

Industrial Centers	Constructed		
	Before 1949	After 1949	
		First Five-year Plan	Second Five-Year Plan
Manufacturing			
Mining			
Hydropower			



промышленности Китая

Legend:

Industrial Regions:

I Northeast
II Northern
III Eastern
IV Central
V Northwest
VI Western
VII Southwest
VIII Southern
Boundaries of industrial regions
Boundaries of provinces

China's main coal bases. Local coal and ore resources furnish the basis for a steel industry at Peking, Tientsin, Taiyuan and Tangshan, and especially at Paotow, the point of departure for the development of industry in the West. (Out of four blast furnaces planned for the first section of the Paotow plant, the first furnace, with a capacity of 1,513 cubic meters, started production in 1959. Five open-hearth furnaces are under construction. After completion of these projects, Paotow will have an annual capacity of 3.5 million tons of pig iron, 3.3 million tons of steel and more than 2 million tons of rolled items, mainly heavy products.)

The Paotow-Lanchow railroad now links Paotow with Northwest China, while the Peking-Paotow and Tatung-Fenglingtu railroads link Paotow with the iron and coal sources of Inner Mongolia, the Lungyen iron mines and the coal basins of Shansi. China's largest hydroelectric station is under construction at Sanmensia, and will supply power to the industrial centers of Loyang, Sian and Chengchow. The Northern Region produces more than one-third of China's coal and one-fifth of the pig iron and steel. The region's steel industry supports machine building, mainly mining machinery, transportation equipment and metallurgical equipment. The region also acquired large chemical plants in the first five-year plan.

The Eastern, or Shanghai, Region includes the country's largest city, Shanghai (with a population of 10 million, including suburbs), which dominates the region's industrial picture, as well as other industrial centers in the provinces of Kiangsu, Anhwei, Chekiang and Shantung. About one-third of the region's industrial projects date from before 1949. It is the country's largest region of light industry and the principal producer of diversified machinery. Shanghai alone has one-third to one-half of China's production capacity in light industry. It also accounts for one-fourth of all machine building, shipbuilding being especially important. The regional development will be further stimulated by the expansion of iron and steel centers at Shanghai and Maanshan.

The Eastern Region is a major producer of textiles, yielding more than 50 per cent of the national output. It is also a major training center for workers in light and heavy industry. After 1949 hundreds of thousands of workers, engineers and technicians were shifted from Shanghai to new industrial areas.

The Central, or Wuhan, Region is relatively new, most of its industrial projects having arisen since 1949. It has been formed on the territory of Hupei, Hunan and Honan provinces on the basis of local iron and coal resources. Heavy industry predominates. Iron mines are situated at Tayeh, east of Wuhan, and coal mines south and north of Wuhan. Near the tri-city of Wuhan (Hankow-Hanyang-Wuchang), which is a railroad center of the Peking-Hankow and Hankow-Canton lines, are deposits of manganese and nonferrous metals. The construction of the Wuhan steel plant will furnish the basis for a machine-building industry. (The Wuhan plan went into

partial operation in 1958, when the first blast furnace with a capacity of 1500 cubic meters opened; a second went into operation in 1959.) The development of the Wuhan region with its steel industry is of prime importance for the economic growth of the Southern, Eastern and Southwestern regions of China.

The Northwest Region is one of the newest, being formed in Shensi, Kansu and Tsinghai on the basis of petroleum resources which also define the regional specialization. It is now the principal producer of crude oil and refined products (Yumen and Lanchow in Kansu, and Lenghu in the Tsaidam Basin of Tsinghai). The production of nonferrous and rare metals, machinery and textiles is also developing. Nearly all industrial enterprises arose since 1949; heavy industry predominates in industrial production.

The Western, or Sinkiang, Region is the newest, developing on the basis of large petroleum reserves at Tushantze and Karamai-Urho. Industrial centers under construction in the second five-year plan predominate here; the region is also specializing in the production of nonferrous metals and textiles.

The Southwest Region includes Szechwan, where most of the regional industry is concentrated, Kweichow and Yünnan. Since 1949 there has been an expansion of heavy industry and railroad construction. The new Paoki-Chengtu railroad links the Southwest and Northwest regions. Under construction are the Chengtu-Sian railroad and the Kunming-Sinagtan railroad, linking the Southwest with the rest of the country. The region is to become the country's principal producer of nonferrous metals. Other industries are steel, machine building, chemicals, petroleum, textiles and sugar. The main industrial centers are Chungking, Chengtu and Kunming.

The Southern Region lies in Kwangtung and Kwangsi provinces, with principal centers at Canton, Nanning and Liuchow. It specializes in the use of subtropical and tropical agricultural products and in nonferrous metals. The principal industries are food and textiles (silk, jute, ramie). Industrial projects under construction in the second five-year plan predominate. The region is a major sugar producer. It also has highly developed handicraft industries, accounting for 20 per cent of the region's industrial output.

Thus two basic tendencies are evident in the formation of industrial centers as a result of the implementation of Socialist principles of distribution of productive forces in China since 1949:

1. The expansion and reconstruction of the "old" eastern industrial areas, beginning during the reconstruction period (1949-52).
2. The formation of new industrial areas, beginning in the first five-year plan and continuing to the present time in the country's interior.

The creation of new steel bases at Wuhan and Paotow promotes the further advance of industry into the Northwest and West, where huge natural resources await exploitation. It should be noted that in addition to the

formation of new interior industrial areas, major changes are also taking place in the "old" areas, which play a key role in the development of the new districts.

An important aspect of the development of productive forces and the territorial division of labor in China is the fact that industry is being promoted in nearly all regions. However, regional differences are still very substantial, both in level of development and in the type of industry being established.

Each of the industrial regions defined in this article represents a distinctive area both in the structure of industrial production and in specialization. The principal industrial products of these regions satisfy both the local demand and the needs of other regions.

RESULTS OF THE THIRD CONGRESS OF THE GEOGRAPHICAL SOCIETY OF THE USSR

By I. P. Gerasimov

(Paper read before the general meeting of the Division of Geological and Geographical Sciences of the Academy of Sciences of the USSR on February 23, 1960.)

(From Izvestiya Akademii Nauk SSSR, Seriya geograficheskaya, No. 3, 1960, Pages 100-107).

The third regular congress of the Geographical Society of the USSR convened from January 30 to February 7, 1960 in Kiev, exactly five years after the previous congress, held in 1955 in Moscow.

In addition to discussion of the report on the work of the Society and the election of officers, the congress examined the principal results of the scientific activity of its members during the last five years and noted assignments for future work. If one takes into consideration that the Geographical Society now comprises over 10,000 members representing the chief active element of the scientific geographic community of the Soviet Union, the great significance of this congress for the future of Soviet geography is quite understandable. It is also in order to make the present communication to the general meeting of the Division of Geological and Geographical Sciences of the Academy of Sciences of the USSR. The All-Union Geographical Society has every reason to request the division to pay attention to the results of its congress and to afford cooperation in the realization of its resolutions.

More than a thousand persons participated directly in the work of the third congress of the Geographical Society of the USSR. Among them were 231 congress delegates elected (at the rate of one delegate per 40 active members

of the Society) at the general meetings of the central organization (in Leningrad), the Moscow branch, the Ukrainian Geographical Society and 66 other regional organizations of the Society located in the various parts of the Soviet Union. (A list of the regional organizations appeared in Soviet Geography, May 1960, Pages 50-51. -Editor, S.G.) The total number of participants in the congress, however, as we have already seen, considerably exceeded the number of official delegates. It is important to note that both among the guests from other cities (over 400) and among the Ukrainians the overwhelming majority of the participants attended the congress on their own initiative. Present at the third congress were also 14 foreign scholars from Poland, Czechoslovakia, Hungary, Bulgaria, Rumania, the United States, Italy, Britain and Canada.

The third congress had a busy and concentrated program. Twenty sessions were held during the eight working days; forty basic papers were read and 220 comments were heard on them; beyond this, seven lectures were delivered to the participants on general questions of Soviet geography, and eight popular scientific lectures on touristic geographic impressions on journeys abroad; over 20 popular scientific geographic films were shown. Furthermore, an excellent exhibit, devoted to various questions of geographic science, was organized at the congress.

Outside the congress, at the factories and houses of culture, as well as at the higher education institutions of Kiev, participants in the congress gave more than 50 popular lectures and papers, heard by over 50,000 persons.

The work of the congress was extensively covered in the local newspapers, radio and television. The principal members active in this publicity work were I. D. Papanin, O. A. Konstantinov, Yu. G. Saushkin, Ye. Ye. Shvede, Ya. Ya. Gakkel', S. V. Kalesnik, B. N. Semevskiy, Yu. K. Yefremov, D. L. Armand, I. P. Gerasimov and others.

Much important preparatory work for the congress was done by its Organizing Committee. It worked out the scientific program of the congress, oriented toward examining the following six scientific problems:

1. The role of geography in the study, utilization, conservation and renewal of the natural resources of the USSR. 2. The economic regionalization of the USSR. 3. The natural (physical-geographic) regionalization of the country for agricultural purposes. 4. The general theory and practical application of landscape-study methods. 5. The moisture and heat regime of the earth's surface. 6. The state of geography in the middle and higher schools in connection with the education reform.

On each of these problems a special symposium headed by one or more chairmen was organized at the Third Congress. The work of the symposiums proceeded as follows. From among Soviet geographers known for their work on a given problem the Organizing Committee chose several principal speakers

who wrote the main papers containing the basic material for discussion. These papers (numbering about 40 and each about one printer's sheet in length) were rotoprinted before the congress and distributed among the participants. At the congress each symposium was opened at the general (plenary) sessions with an introductory talk by the chairmen. At these sessions, the principal speakers on a problem were allowed 10 to 20 minutes each for a statement of the main points of the published paper, displaying the graphic material and answering questions. The remainder of the time in the work of the symposiums was used for discussion of the main papers. The length of comments was also limited to 10-20 minutes; the number of sessions of the symposiums was determined by the number of discussants. The general results of the work of the symposiums were summarized by the chairmen.

Here is a brief account of the papers and comments at the symposiums.

Problems	Number of papers read	Number of discussants
1. Natural resources	11	47
2. Economic regionalization	6	48
3. Physical-geographic regionalization	6	39
4. Landscape studies	4	36
5. Moisture and heat regime	8	22
6. Geography in the Higher Educational Institutions and the schools	5	27(*)

(*) Not all those registered were able to speak.

The question arises what advantages for the work of the congress did this procedure offer? They are the following. First, all its work acquired a purposeful character, making it possible to discuss all aspects of the problems posed and enabling practically all interested participants to express themselves. Second, the adopted procedure and the content of the scientific problems, which on the whole were integrated in character, contributed in a high degree to rally the participants, and to unite their scientific interests instead of breaking them up into numerous groups in special sections and commissions, as is usual in big conferences..

If one takes into consideration that, in addition to the general congresses of the Society, Soviet geographers meet periodically for deliberations and conferences of a special character (for example, climatological, hydrological, geomorphologic, landscape-study and other conferences), the character of the work of the congress proved quite rational. As was seen from the many comments by delegates, it received wholehearted approval from the Soviet geographic community.

On the basis of the papers and comments in the discussions, the Third Congress of the Geographical Society of the USSR adopted detailed

resolutions on each of the six problems examined. At the last plenary sessions these resolutions were expanded by proposals advanced during the discussion of the report of the two vice presidents of the Society (S. V. Kalesnik and I. P. Gerasimov, regarding the general report and the report of the National Committee of Soviet Geographers). These proposals concerned, in the main, the further work of the Geographical Society and the general state of geographic science in the USSR. Combined with the principal resolutions of the six symposiums, these proposals formed part of the general resolution of the Third Congress of the Geographical Society of the USSR, unanimously adopted by the congress participants at the final session on February 7, 1960. We use the text of the general resolution to characterize the principal results of the work performed by the congress.

The problem of the study, inventory, conservation, rational utilization and renewal of natural resources, (chairmen: D. L. Armand, I. P. Gerasimov, K. A. Salishchev, Yu. G. Saushkin), occupied first place at the congress with respect to its scope and the breadth of the discussion. This was, of course, quite in order and clearly expressed the high degree of responsibility that Soviet geographers are assuming for the present state and further prospects of the scientific elaboration of this national problem. In the course of the discussion, firm and straightforward assertions were made regarding the still entirely inadequate role of geographers in the scientific work on the inventory, the evaluation, the rational utilization, the conservation and renewal of the varied natural wealth of the Soviet Union. Most of the comments contained appeals for careful and thoughtful utilization of natural resources and for prevention of a careless and uneconomical attitude toward them, which is causing great economic losses and other undesirable consequences. The congress also discussed measures to conserve many specific natural features in the Soviet Union (for example, Lake Baykal).

In the resolutions of the congress, the conduct of scientific research into natural resources (climatic, water, land and plant and fauna resources) was recognized as a most important task on a nationwide scale. Two major organizational measures were advocated, on the basis of which the present situation should be radically improved. The first is the promulgation of a national law on the conservation of nature, the rational utilization and the renewal of natural resources; the second is the creation of a special State Committee on Natural Resources, designed to direct all work on the scientific study, inventory, utilization and control of utilization of natural wealth.

In its resolutions on this problem the congress also paid attention to questions of the study, inventory, mapping and economic evaluation of natural resources. Note was taken of the considerable achievements of Soviet geography in the study of resources (for example, climatic, water, land, etc.) and especially in mapping them. At the same time, the need was noted for still greater development of such work and particularly the speeding up of the compilation and publication of maps on geomorphology, soils, hydrology, geobotany, etc. In this connection the congress regarded it as necessary to restore and activate the Commission on Maps of Nature that existed formerly under the Division of Geological and Geographical Sciences of the Avademy of Sciences of the USSR.

Turning special attention to the present state of nature preserves and natural monuments, the Third Congress of the Geographical Society noted the useful activity of the Commission on Conservation of Nature under the Division of Biological Sciences of the Academy of Sciences. At the same time, the congress regarded it as necessary to broaden the sphere of activity of this commission (particularly in the field of the geographic sciences) and to transfer it directly to the management of the Presidium of the Academy of Sciences. We expect that the general meeting of the Division of Geological and Geographical Sciences will support this proposal of the congress.

The very beginning of the debate on questions of economic regionalization (chairman - O. A. Konstantinov) presaged a sharp discussion of this problem at the congress. This is not to be explained solely by the great significance of the problem for economic geography; as is known, data on economic-regionalization questions are of great importance in the practice of economic planning. For this reason, the existing scheme of general economic regionalization of the USSR and the corrections in it that are now being advocated by various groups were subjected to wide discussion at the Third Congress of the Geographical Society. Much attention was also devoted at the symposium to the methods of intra-republic and intra-oblast regionalization, as well as to the study of population-geography questions. In spite of the sharp discussion that developed, a unified methodological position for all Soviet economic geographers was found on regionalization questions in the adopted resolutions. It was formulated in the form of the principle of the objective existence of economic regions, the absolute necessity of taking into account the prospects of national specialization in distinguishing the major economic regions; the integrated development of a region, the achievement of a high level of technical progress, the highest productivity of social labor and the careful analysis of the ethnic peculiarities of the population.

The congress instructed the Council of the Geographical Society of the USSR to organize under it a Permanent Bureau for the Coordination of Scientific-Research Work on all kinds of economic regionalization.

On the problem of the natural (physical-geographic) regionalization of the country for agricultural purposes (chairmen - F. F. Davitaya and N. A. Gvozdetskiy), several specific regionalization projects, which are the result of many years' work by large teams of scholars, were submitted for examination by the congress. All these materials were examined and discussed at a special symposium. The congress noted the great amount of valuable work done by a number of institutions, especially in mobilizing diverse scientific materials in the provinces. It was recognized as necessary to continue the work begun and to create a unified, coordinated scheme of natural regionalization of the USSR for agricultural purposes on the basis of the coordinated utilization of all the materials presented. The congress also regarded it as necessary to organize under the All-Union Academy of Agricultural Sciences an interdepartmental and authoritative Commission on Natural Regionalization from representatives of the Agricultural Academy, the Academy of Sciences of the USSR, the universities, the Hydrometeorological Service of the USSR and the Main Administration of Geodesy and Cartography. The tasks of the

committee are to include the coordination of all the work done on general natural regionalization for agricultural purposes, as well as cooperate in every way possible in additional investigations on questions of applied integrated regionalization, aimed directly at satisfying the demands of agriculture and forestry, as well as hunting. It may be stated briefly that the congress regards as the chief function of such a commission the consistent introduction of the results of scientific geographic work into agriculture on a broad practical scale.

On the problem of the general theory and practical application of landscape studies (chairman - S. V. Kalesnik) much fruitful work was also done at the congress, largely on the basis of the results of the four special landscape study conferences held between the Second and Third Congresses of the Geographical Society. It may be noted that the chairman's attempts to limit the discussion to methodological questions proved unsuccessful. The present extent of so-called landscape studies in Soviet geography is so wide that the discussion at this symposium turned out to be especially protracted. This was clearly reflected in the resolutions adopted, which contained an extensive list of scientific questions requiring further treatment (for example, the typology of landscapes and landscape mapping; the relationship between regional and typological units in physical geography; the general characteristics and principles of applied landscape science; and others). One should especially note the interest of the congress in the use of modern physical and chemical methods in work on physical geography, as well as the resolution to hold a fifth conference on landscape studies in Moscow in 1961.

The problem of the heat and water balance of the earth's surface (chairmen-M. I. Budyko and I. P. Gerasimov) attracted the attention of the congress participants both by its novelty and the prospects for further elaboration and practical use. Climatologist-geographers and hydrologists took the most active part in its discussion, although the final resolution of the symposium contains pledges for all physical geographers. It states that by working out the present problem physical geography can greatly develop its own general theory and pass from descriptive methods to more precise quantitative ones ascertaining the physical essence of the interaction of natural processes and phenomena. The problem is also viewed as the scientific basis for a more efficient utilization of the resources of heat and moisture and for the elaboration of measures for transforming nature, including measures on a world scale (for example, the artificial thawing of the continental and marine ice, the reversal of streams and sea currents, changes in climate through a radical transformation of the underlying surface, and so forth).

The Geographical Congress displayed great interest in the rapid processing of the findings of the International Geophysical Year, which are necessary for further work on the problem, and emphasized the necessity of rapidly organizing integrated field stations in various natural zones to make a thorough study of the dynamics of physical-geographic phenomena.

The symposium on geographic-education questions, which terminated the

work of the congress (chairmen - Yu. K. Yefremov, A. I. Solov'yev and A. M. Ryabchikov), led to heated discussion. Almost all speakers expressed the serious concern of Soviet geographers over the present state of school geography, especially in connection with the current school reform. The congress came to the conclusion that the education authorities, in curtailing geography courses in general and, in particular, in abolishing the course in the geography of the Soviet Union in the fourth grade of the middle school, undoubtedly underestimate the general educational and ideological significance of geography. In this underestimation the Geographical Congress sees a conflict with the first point of the school-reform law in the matter of the further raising of the level of general and polytechnical education. For this reason, the congress instructed the Council of the Geographical Society of the USSR to acquaint the authorities with the viewpoint of the scientific community regarding the position of geography in our schools. In addition to this sharp but well-founded criticism the resolutions of the congress on geographic education contain a number of important constructive proposals. We shall note among them the proposals for the introduction of larger sections of local-area content into the programs of courses of USSR geography; for the wider use of geographers with university education in the middle schools; for the development of scientific tourism among geography teachers; and others.

Important sections of the resolutions of the congress are devoted to general questions of the organization of the geographic sciences in the USSR and to the expansion of the publication and distribution of geographic literature. Among the resolutions of this type, in addition to the recognition of the necessity for further development of the network of geographic institutions in the provinces (particularly the early creation of institutes of geography in the Ukraine, Kazakhstan, Uzbekistan, Latvia and Armenia), one should note the special attention paid to the outstanding results and tasks of scientific research in oceanography and marine meteorology. The congress found it necessary to give a broader representation in the activity of the Geographical Society of the USSR to work on oceanography and to instruct the Council of the Society to hold an All-Union Oceanographic Conference for this purpose. A number of resolutions were also adopted on the development of phenological work.

At one of the last sessions the credentials committee of the Third Congress of the Geographical Society of the USSR reported interesting data on the composition of its participants. Representatives of 21 ethnic groups of the Soviet Union took part in the work of the congress. Nearly all the delegates of the congress (222 out of 231) had a completed higher education; among them predominated staff members of scientific-research organizations and higher educational institutions (194) and there were considerably fewer teachers and staff members of production organizations. Middle-aged and elderly persons clearly predominated (from 40 to 60 years of age; 146 out of 231); the number of delegates younger than 40 or older than 60 was considerably smaller.

Even without knowing (until one of the last sessions) the above-mentioned statistics, the Third Congress adopted a number of resolutions on the further work of the Geographical Society of the USSR. It recognized it as a most important task to expand considerably the sphere of activity of the Society and to lend it more of the character of a mass organization, primarily by heading the local-area study movement in the provinces, and by engaging in it teachers, local scientific forces, planning economists and statisticians, agronomists, land-use experts, forest managers and other specialists in the nature and economy of the respective regions.

The Congress oriented the work of the branches and sections of the Society and the local-area study movement toward an early solution of national economic tasks, above all in the field of the study, rational utilization and renewal of natural resources, intra-oblast physical-geographic and economic regionalization, general (landscape) and special-purpose geographic mapping, the improvement of geography teaching in the middle schools and higher educational institutions and the expansion of the propagation of geographic knowledge.

The Congress recommended that the resolutions evolved on the individual problems be used as general guideposts for the development of the local-area study movement and the raising of its scientific level and practical significance.

It also outlined the most important organizational measures for the early realization of the resolutions adopted. It instructed the Council of the Society to hold an All-Union Conference of representatives of local-area studies to examine and carry out the resolutions relating to this subject; approved the creation of a Bureau of the Branches and Sections of the Geographical Society in Siberia and the Far East, designed to intensify the Society's work in the eastern regions of the country; recognized it as necessary to decentralize in every possible way the Society's work in the union republics and in the provinces in general; and reorganized the composition of its Council, including in it as permanent members the Presidents of all the branches of the Society in the union republics and the President of the Siberian Bureau.

At its last meeting, the Third Congress voted a message to the Central Committee of the Communist party. The text of the message follows:

"The Third Congress of the Geographical Society of the USSR, convening in February, 1960, in Kiev, at a time when the whole Soviet people is successfully executing the vast seven-year plan for the construction of the material and technical base of communism, has discussed the question of intensifying the work of Soviet geographers toward the development of the national economy, science and culture of the USSR. Soviet geographers have in recent years achieved successes in mapping, exploring the Arctic and Antarctic and the Oceans, and studying the geography of the USSR, and have linked science more closely with practice by organizing field

studies needed by the regional economic councils and planning organizations to evaluate the conditions of agricultural development. However, this work is still not sufficiently purposeful and does not embrace the whole community of Soviet geographers.

"By the end of the seven-year plan Soviet geographers should have compiled and issued a number of geographic atlases of the republics and oblasts, characterizing the nature, population and economy of the various regions of the Soviet Union, as well as an atlas of the agriculture of the whole country, a climatic atlas of the agriculture of the whole country, a climatic atlas and a new physical-geographic atlas of the world; should take the most active part in the integrated investigation of the nature, population and economy of the various parts of the country and especially its eastern regions; should complete the work on natural regionalization for agriculture; should widely develop the integrated study of the productive forces of the economic regions; should boldly introduce quantitative methods into geographic work to make geography an exact science of the use, evaluation and renewal of resources of the geographic environment and of the territorial organization of productive forces.

"Great are the role and responsibility of geography in the Communist upbringing of the people, in the understanding of their fatherland and in the nurturing of love for it and brotherhood between the peoples of the whole world. Soviet geographers are confronted by a great effort to create multivolume publications on the Geography of the USSR, and on World Geography, as well as an extensive, popular scientific geographic literature, good textbooks on geography for the schools, geographic motion-picture films, slides, etc.

"The Congress of the Geographical Society of the USSR devoted much attention to the development of mass geographic local-area studies in the republics, oblasts, and rayons by teachers and other local-area specialists. The Congress considers that a broad local-area study movement will enable the Geographical Society of the USSR to become a mass scientific society.

"The Congress, inspired by the historical resolutions of the 21st Congress of the Communist party, assures the Central Committee of the Communist party that Soviet geographers will concentrate their efforts upon the further development of Soviet geographic science and the strengthening of its ties with the practice of Communist construction."

GENERAL RESOLUTION OF THE THIRD CONGRESS OF THE GEOGRAPHICAL SOCIETY OF THE USSR

(Kiev, January 30 to February 7, 1960)

(From Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva SSSR, No. 3, 1960, Pages 216-26).

The Third Congress of the Geographical Society of the USSR summed up the scientific activity of Soviet geographers during the five-year period since the Second Congress of the Society; examined the report on the Society's activity; outlined the orientation of further scientific work toward the fulfillment of the assignments of the seven-year plan for the development of the national economy of the USSR and the working out of general plans of long-range development; and determined the improving and reorganizing of the Society's activity in accordance with these tasks.

On the basis of a broad discussion of the two reports and 39 scientific papers on six problems (symposiums), in which about 240 delegates and participants in the Congress took part, the Third Congress adopted the following resolutions.

I. On the Reports of the Geographical Society of the USSR and the National Committee of Soviet Geographers.

1. The report of the Geographical Society of the USSR for 1955-59 is to be confirmed. The work of the Council of the Society for the period covered by the report is to be recognized as satisfactory. The work of the National Committee of Soviet Geographers is to be approved.

2. It is resolved to regard it as a most important task in the further development of the Geographical Society of the USSR to effect a considerable expansion of its sphere of activity and to lend the Society more of the character of a mass scientific organization, primarily by heading a local-area study movement in the provinces and by drawing into it geography and biology teachers, local teaching staffs, economists, planners and statisticians, agronomists, land-use experts, forest managers and other specialists in the nature and economy of the respective regions.

3. To orient the work of the branches and sections of the Society and the local-area study movement headed by them toward a solution of the national economic tasks emanating from the decrees of the 21st party congress , above all, in the field of the study, rational utilization and renewal of natural resources, intra-oblast physical-geographic and economic regionalization, general (landscape) and special-purpose geographic mapping, improvement of geography teaching in the middle schools and higher educational institutions and the propagation of geographic knowledge.

To use the resolutions of the 3rd Congress on individual problems as general aims for the development of the local-area study movement and the elevation of its scientific level and practical significance.

To recommend to the branches and sections of the Society, in carrying out these resolutions, to develop businesslike relations with the local scientific and economic organizations, particularly with the planning organs and regional economic councils, and agricultural and forestry administrations and departments.

4. To obligate the Council of the Society to work out and effect a system of social and organizational measures insuring the fulfillment of the above-mentioned task and, in particular, to create an All-Union conference of representatives of the local-area study community to discuss these measures and their practical realization.

5. Another important task in the development of the Geographical Society of the USSR closely related to the foregoing is the strengthening and growth of all the branches and sections of the Society, cooperation in their initiative and independent activity in the promotion of local-area studies and scientific-propaganda activity, and, above all, in the most rapid conversion of the branches of the Society of the union republics into authoritative centers of geographic work, capable of guiding such work at the local level, in the sections of the Society, and of rallying geographic forces around such centers.

6. For the purpose of better coordination of the work and the exchange of experience and scientific results, it is resolved to regard it as advisable to hold regional conferences both within the branches and sections and between the various branches and sections. It is resolved to recommend that these conferences be held in collaboration with scientific and mass-participation societies.

7. Taking into account the growing importance of the eastern regions of the USSR in the country's general economy, it is resolved to approve the creation of a Bureau of the Branches and Sections of the Geographical Society in Siberia and the Far East and to regard it as an important task to strengthen the activity of this Bureau, and also to develop most rapidly the scientific activity of the Institute of Geography of Siberia and the Far East.

8. In order to enhance the general guiding role of the Council, it is resolved to instruct the Council of the Society to work out measures to strengthen personal relations with all the organizations of the Society, and to recommend systematic trips by members of the councils and auditing commissions of the central organization and branches to the lower-level organizations of the Society.

9. To propose to the branches and sections of the Society that they systematically send information about their activity to the Council of the Society; and to the editorial board of the Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva' that it publish such information in the journal. In case of necessity, to publish a special rotaprinted information bulletin.

10. To instruct the Council of the Society to advocate before the Presidium of the Academy of Sciences of the USSR a substantial enlargement of the size of the journal Izvestiya VGO and the enabling of the Society to publish a popular scientific geographic journal to be entitled Zemlya i Lyudi (The Earth and its People).

11. Owing to the increased volume of work of the Geographical Society, to create the office of Chief Secretary in the Council of the Society.

The Chief Secretary is to be chosen by the Council of the Society from among the members of the Council.

12. To decree that the chairmen of the geographical societies of union republics (branches located in the union republics) and the chairman of the Siberian Bureau of the Geographical Society of the USSR shall be members of the Council of the Geographical Society of the USSR above the quorum required by the Charter for the adoption of resolutions.

13. To instruct the plenary meeting of the Council of the Geographical Society of the USSR to hold an election of honorary members and corresponding members of the Geographical Society of the USSR in the name of the Third Congress of the Society.

II. On Questions of the Publication of Geographic Literature

1. Owing to the great growth of geographic work in the USSR and the accumulation of an immense amount of new factual data on the geography of the country and its regions, it is resolved to recommend to all organizations and institutions conducting research in the field of the geographic sciences that they expand the publication of materials and the results of their research in addition to expanding their field work.

2. To recommend to the State Publishing House for Geographic Literature that it expand the publication of regional literature on the USSR and its republics, krays, oblasts, rayons and natural and economic features, especially on those deserving priority publicity as places of new construction projects and areas of new settlement and economic development.

3. To instruct the Council of the Society to advocate before the Ministry of Culture USSR and the Ministry of Finance USSR a change in the existing system of book sales to insure the unhampered dissemination of geographic literature published by provincial publishing houses into the book-trade network of the other republics, krays and oblasts of the Soviet Union.

4. To instruct the Council of the Society to work out a system of measures to insure wide publicity about geographic literature published or to be published by central and provincial publishing houses, which measure should contribute to increasing the number of orders for geographic literature and consequently the number of copies of geographic editions printed.

III. On the Problem of the Study, Inventory, Conservation, Rational Utilization and Renewal of Natural Resources

1. It is resolved to regard it as one of the most important tasks of the Geographical Society of the USSR to develop research and interdepartmental coordination of work on the problem of the study, inventory, conservation, rational utilization and expanding the renewal of natural resources, as well as of conserving natural features especially valuable from a scientific or esthetic viewpoint.

To regard the investigation, organization of the inventory and economic evaluation of natural resources as a most important task on a national scale.

2. To consider it necessary to publish a national law on the conservation of nature, the rational utilization and renewal of natural resources -- soil fertility, surface and underground waters, forests and other plant resources, useful fauna and the atmosphere. It is desirable to include in the law a statement of the basic principles of the utilization of natural resources, regulations on the limitations to be established in this respect, a definition of the governmental organs responsible for the proper planning of the exploitation of resources, for taking an inventory and for exercising control over the execution of the plans. Responsibility should be established in the law for the violation of the existing norms, and measures should be provided for the training of specialists in inventorying and restoring natural resources. The concepts of a scientific system of utilization of natural resources shall serve as the motivation for the legislative restrictions.

3. To take note that the existing obstacles in the way of conserving and restoring natural resources can be eradicated only under condition of the creation of a Committee on Natural Resources of the Council of Ministers USSR combining in its area of competence the functions of inventory, planning and control. The premises for successful operation of the Committee are the availability of data on the natural resources and the existence of definite ideas about the normal system of utilization of each of the resources. Geographic science can play a big role in insuring these premises.

4. To consider that the planning and building of major structures must be done as a part of the new regional planning of territories falling within the sphere of influence of new building projects, teams of specialists being engaged for this purpose in the technical, agricultural, geographic, biologic and economic sciences. Only such an approach insures that the new project will respond to the local natural conditions, that the natural resources of the territory will be utilized rationally and that the best living conditions will be created for the population.

5. To regard as necessary the further development of government work on the publication of a series of physical maps. In particular, to recommend, along with the maps already being published at 1:1,000,000 for soils and geology, the compilation to the same scale of a geomorphic, a geobotanic, a forest, a hydrologic and other maps showing the composition and distribution over the USSR of the most important types of natural resources. It is also necessary to accelerate the work on the publication of the Hydrologic Atlas of the USSR, to expand the work in marine cartography and to republish the second volume of the Marine Atlas, utilizing the materials of the International Geophysical Year.

6. To approve the initiative of the universities, scientific-research institutes and local organizations regarding the publication of integrated geographic atlases of the republics and oblasts of the USSR. To regard it as necessary: a) to strengthen the work on integrated atlases at the level of the Main Administration of Geodesy and Cartography; b) to finance the work on these atlases in a way similar to the financing of mapping work of national significance; c) to strengthen and expand the composition of the Editorial Scientific-Technical Council on Integrated Atlases operating under Moscow University.

To instruct the Council of the Society to convoke a scientific conference on the creation of integrated regional atlases.

7. To take note of the great and responsible role that geographers must play in reorganizing and expanding research into land resources, in assisting land-use experts in regional planning, land organization and the establishing of the most efficient methods of utilizing lands. To consider the compilation of a Land Cadaster of the USSR as a first-priority task in the study of land resources.

To consider it also necessary to publish a special government decree on the control of erosion and soil deflation and to create a Land-Conservation Service insuring the protection and proper utilization of the soils and natural fodder lands.

8. To note that the forest economy of the USSR has made considerable progress in the inventory and organization of forests, forest-renewal work in little-forested regions and the setting aside of forests for special conservation. Great success has been attained by Soviet science in matters of forest typology, in the study of the influence of forest on the geographic environment, particularly in the investigation of the role of the forest as a factor in the regulation of the climate and water regime, the habitat of useful animals and plants, and as a place for recreation and therapy for workers. Nevertheless, the general state of the forest economy continues to be unfavorable. For this reason, it is resolved to consider that the task of reorganizing the country's forest economy and expanding the renewal of forests in the regions of intensive exploitation has now become one of the major governmental problems.

9. Noting the great progress in the utilization of the river resources for power and navigation, it is resolved to regard as inadequate the rate of execution of water reclamation work, the use of land-tilling methods that contribute to regulating soil moisture, and the development of a centralized water supply.

To consider it necessary to strengthen the economic justification of the construction of hydroelectric stations connected with the flooding and submerging of extensive areas, to take into account to a greater extent the interests of the riparian branches of the economy and, in particular, to seek all possible means of preventing the creation of unproductive shallows along the periphery of reservoirs.

To consider it an urgent task to combat the growing pollution of water bodies by industrial and domestic sewage.

10. While noting as important achievements of Soviet science the publication in the last few years of climatic and agroclimatic handbooks and climatic descriptions, as well as the preparation of the Climatic Atlas of the USSR for publication, it is resolved to consider that many properties of climate important for practice have still not been sufficiently studied. For this reason, it is resolved to recognize it as necessary to arrange for regular publication of meteorological yearbooks containing the results of the processing of the records of self-recording instruments and to intensify the economically important work on the study of the fluctuations of climate.

11. To approve the proposed list of state nature preserves and natural monuments for the Ukrainian SSR compiled by the Ukrainian Geographical Society and the Ukrainian Society for the Conservation of Nature, and to recommend to other branches and sections that they compile similar lists.

12. While noting the useful activity of the Commission on the Conservation of Nature of the Academy of Sciences, it is considered wrong to subordinate it to the Department of Biological Sciences. Taking note that the conservation of nature and the insurance of the renewal of natural resources affect both animate and inanimate nature and represent not only a biological, but also a geographic and economic task, it is resolved to consider it advisable to subordinate the Commission on the Conservation of Nature directly to the Presidium of the Academy of Sciences of the USSR and to engage biologists, geographers and economists in its work.

13. To note that public initiative is of exceptionally great significance in the rational utilization, conservation and renewal of natural resources. In particular, the members and local organizations of the Geographical Society should be organizers of this initiative and should work in contact with the republic societies for the conservation of nature, local-area study societies and museums, youth organizations and active teachers of the middle and higher schools. To recommend to the Council that it examine the question of the system of awards or encouragement of members of the Society for active work on the conservation of nature.

IV. On the Problem of Economic Regionalization

1. It is resolved to note that economic-geographic investigations into questions of economic regionalization have acquired wide scope in the USSR: Soviet economic geographers have published many works on problems of economic regionalization, are actively participating in the solution of practical questions of regionalization both in the center and in the provinces, and are displaying great interest in problems of economic regionalization, which occupy one of the central places in economic geography.

2. To consider that in view of the difference in approaches to economic regionalization of the USSR one must proceed from the principles of the objective existence of regions, consideration of the prospects, national specialization (the region as a link in the national division of labor); integration of the development of regions, technical progress, the highest productivity of social labor and consideration of the ethnic factor.

3. To consider it as one of the most important tasks of Soviet economic geographers to work out thoroughly the questions of methodology of economic regionalization as applied to the conditions of the period of advanced construction of communism.

An important task is the working out of scientific methods of all kinds and gradations of economic regionalization and typology of economic regions. Research into the regionalization of specific economic sectors should also be intensified.

4. To instruct the Council of the Society to organize under the Presidium of the Society a permanent Bureau for the Coordination of Scientific-Research

Work on economic regionalization of the USSR, to be done by the branches and sections of the Society. To instruct this Bureau to publish an information bulletin on the work done.

5. To regard as desirable the participation of the Geographical Society of the USSR in international work on economic regionalization in the Socialist countries, as well as in the International Geographical Union.

6. To instruct the Council of the Society to address to the Ministries of Higher and Middle Specialized Education of the USSR and union republics and to the Academy of Sciences of the USSR and union republics a request to convoke, jointly with the Society, regular conferences of economic geographers working in the higher schools and scientific institutions, particularly to discuss problems of economic regionalization. It is desirable to hold these conferences by turns in the major university cities of the various union republics.

7. To instruct the Council of the Society to raise before the respective organizations the question of insuring the permanent participation of economic geographers in work of improving the administrative-territorial division of the country.

8. To note the necessity of intensifying the treatment of questions of population geography, which is important for economic geography in general and particularly for more thorough research in economic regionalization. To instruct the Council of the Geographical Society of the USSR to create for the coordination of this activity in 1961-62 a special all-union conference with the participation not only of the branches and sections of the Geographical Society, but also of the scientific and planning institutions whose work is connected with questions of population geography and regional planning.

V. On the Problem of Natural (Physical-Geographic) Regionalization of the Country for Agricultural Purposes

1. To note that in the line of fulfilling the decisions of the Central Committee of the Communist party and of the Council of Ministers of the USSR on the further development of agriculture a considerable amount of work has been done in the last few years by Soviet geographers and agricultural specialists in regionalizing and evaluating the natural conditions of the agricultural production of the USSR and in working out rational systems of conducting agriculture by natural and economic zones, insuring the greatest agricultural output per 100 ha. of land with the least expenditure of labor and funds.

2. To recognize it as necessary to continue the work on the natural (physical-geographic) regionalization of the USSR for agricultural purposes.

3. To consider that integrated physical-geographic regionalization should be carried out as a general scientific regionalization capable of being used in the various branches of the national economy. It should supply the basis for intensified work on applied integrated regionalization, clearly aimed at satisfying the needs of agriculture and forestry, as well as of the hunting industry. Accordingly, all the elements of the natural environment having significance for agriculture should be provided for in the characterizations

of regions; the principal measures for the productive utilization of natural resources in agriculture should be justified; and forecasts of changes in the natural environment under the influence of the contemplated systems of conducting agriculture should also be made.

4. To recognize it as necessary to create a unified scheme of special natural regionalization of the USSR for agricultural purposes on the basis of the use of materials of the Council for the Study of the Productive Forces, the Soil Institute and the Institute of Geography of the Academy of Sciences of the USSR, the inter-university work on physical-geographic regionalization, the zonal commissions of the Agricultural Academy and the Hydrometeorological Service of the USSR.

5. For the coordination of all work on natural regionalization for agricultural purposes and the compilation of the above-mentioned maps and characterizations, it is resolved to request the organization under the Agricultural Academy of an interdepartmental commission of representatives of the Agricultural Academy, the Academy of Sciences of the USSR, the universities, the USSR Hydrometeorological Service and the Main Administration of Geodesy and Cartography.

In order to intensify scientific-theoretic and methodical work on general scientific physical-geographic regionalization, it is resolved to regard as advisable the organization of an interdepartmental commission under the Academy of Sciences of the USSR.

VI. On the Problem of the Heat and Moisture Balance of the Earth's Surface

1. It is resolved to note that the problem of the heat and moisture balance has now acquired great significance for the development of the theory of physical geography, revealing the genetic unity of the natural geographic environment, uniting the whole system of geographic scientific disciplines and permitting transition from the descriptive methods of studying the geographic envelope of the earth to more precise quantitative methods ascertaining the physical essence of the interactions between natural processes and phenomena. To consider that this problem should be the broad scientific basis for a more efficient utilization of the natural resources of heat and moisture and for a scientific system of measures for the transformation of nature, including those on a world-wide scale.

For this reason, it is resolved to recognize the significance of the problem of the heat and moisture balance of the earth's surface for the further development of the scientific theory of physical geography, for the transition of geography to modern research methods and for a sharp enhancement of its general significance in the national economy of the USSR.

2. To recommend to the Academy of Sciences of the USSR and the Hydrometeorological Service of the USSR:

(a) That observations of the components of the heat and moisture balance in the Soviet Union be considerably expanded, particularly in the mountainous and polar regions. That the hydrogeologic network

observations be expanded. That a broad network of voluntary agrometeorological posts be organized in kolkhozes and sovkhozes.

Because of the insufficient development of hydrometeorological observations on oceans and seas, it is recommended that measures be taken to expand these observations with regard both to the main meteorological elements and the componenets of the heat and moisture balance.

(b) That research be organized to bring about a considerable improvement in the methods of measuring such indices of the heat and moisture balance as atmospheric precipitation, the quantity of soil moisture, total evaporation, productive evaporation, turbulent heat exchange, heat exchange in the soil and in water bodies.

(c) That measures be taken for the prompt publication of the Soviet and international actinometric observation data in accordance with the program of the International Geophysical Year.

That the publication of the results of the new research in the compilation of maps of the components of the heat and moisture balance be speeded up, including the new world Atlas of the Heat Balance and the Hydrologic Atlas of the USSR.

That a cadaster of the water balance of the USSR be prepared and published, taking into account all the indices of the balance that are necessary for production and scientific purposes.

(d) That stationary observations be organized at several points situated in different natural zones with regard to the whole complex of natural surface processes, including indices of the moisture and heat balance, the processes of soil formation and erosion, the dynamics of the natural plant cover and the dynamics of the numerical strength of animals.

(e) That an international symposium be held in 1961 on the problem of the heat and moisture balance of the earth's surface.

VII. On the Problem of the General Theory and Practical Application of the Methods of Landscape Science

1. The Congress notes with satisfaction that in the last few years the practical orientation of physical-geographic, and especially of landscape research, has been intensified. Large geographic study teams have participated in the investigation of regions of new economic development, in the study of the productive forces of the country, in physical-geographic regionalization for agricultural purposes, in the government soil survey on a landscape basis, and so forth.

2. It is resolved to consider that it is necessary for the further development of landscape studies as a science of both theoretical and applied significance:

A. To concentrate the efforts of geographers upon working out, in the very near future, the following major problems:

(a) typology of landscapes and landscape mapping;

(b) relationship of regional and typological units in physical geography;
(c) methods of quantitative characterization of landscapes on the basis of the study of the moisture and heat balance in landscapes;
(d) publication of regional landscape monographs;
(e) general characteristics and principles of applied landscape science.

B. To pay special attention to landscape research with a practical bent (for purposes of agriculture and forestry, hydrotechnical construction, regional planning, and so forth), endeavoring to discover the dynamics of landscapes and to work out forecasts of changes in landscapes under the influence of natural and anthropogenic factors. To undertake, jointly with other specialists, the creation of methods of interpreting landscape maps for practical purposes.

C. To extend landscape surveys systematically to new territories of the USSR.

D. To make wide use, in landscape research, of aerial methods affording geographers abundant, objective and reliable material.

3. To undertake concrete measures to introduce new physical and chemical methods into landscape and paleogeographic research, for which purpose it is proposed:
(a) to organize under the Geographical Society of the USSR a commission on questions of the application of modern physical and chemical methods in geography;
(b) to recommend to the geography faculties of the universities that they provide practical exercises in the latest methods in their teaching plans.

4. To approve the resolutions of the 4th (Riga) All-Union Conference on Landscape Science:
(a) on the creation, under the Geographical Society of the USSR, of a commission on the unification of landscape-science terminology;
(b) on the creation, under the Geographical Society of the USSR, of a commission on landscape maps and on the publication of a special information bulletin by this commission;
(c) on the convocation of the fifth conference on landscape-science questions in Moscow in 1961.

VIII. On General Questions of the Organization of the Geographic Sciences

1. It is resolved to take note that the existing network of scientific geographic institutions in the USSR is inadequate in the light of the tasks set by the seven-year plan of national-economic development. For this reason, it is resolved to recognize it as necessary to create independent scientific institutes of geography in all the union republics and, above all, in the Ukrainian, Uzbek, Latvian, Kazakh and Armenian SSR's.
2. To recognize the research in oceanography done in the USSR as an

inseparable part of the general sphere of scientific activity of the Geographical Society of the USSR. To consider it therefore desirable to create oceanographic departments or commissions in the geographical societies of the maritime union republics and in their maritime sections, engaging in their work broad groups of local specialists connected with navigation and oceanographic research.

3. To instruct the Council of the Society to convoke in the very near future an all-union conference on oceanography and marine meteorology, the chief purpose of which will be to define the first-priority problems of studying the seas and oceans and the practical tasks of the Hydrographic and Marine Meteorological Service.

4. To call the attention of the hydrographic and marine hydrometeorological institutions to the necessity of expanding and perfecting their work on the safety of navigation in accord with the increase of sea-going transport and fishing fleets contemplated for the current seven-year period and with the possibilities of modern science and technology, as well as the necessity of complete harmony between the measures taken by them.

5. To recognize it as necessary to effect a systematic publication in the USSR of phenological handbooks and yearbooks containing information on the dates of occurrence of economically important seasonal phenomena of nature, as well as on the most important seasonal phenomena characterizing the seasonal rhythm of the landscape as a whole.

To recommend the inclusion of phenological maps in all the integrated atlases of the USSR, union republics, krays and oblasts, as well as in the respective special-purpose atlases.

IX. On Questions of Geographic Education

A. Regarding Middle Geographic Education.

1. It is resolved to consider that the role of the geography course in Soviet schools, like that of history and literature courses, is determined primarily by its general educational and ideological significance, which has grown especially in the period of the broadening of international relations and in the course of the performance of the great tasks set by the seven-year plan for the development of the country's national economy. At the same time, geography, especially the courses in the geography of the USSR in the eight-year and middle schools, plays a substantial role in broadening the polytechnical horizon of pupils and thereby contributes to their preparation for practical careers. To note that the education authorities underestimate the general educational and ideological significance of geography in the school. Geography is the only subject of instruction in which the number of hours in the new teaching program of the eleven-year school has been reduced compared with that of the ten-year school.

According to the new teaching program of the eleven-year school, the number of weekly lessons in geography is smaller than in the schools of other countries of the world, particularly in the Socialist countries.

In this attitude toward school geography the congress sees a conflict with Point 1 of the Law on the School Reform in the matter of the further raising of the level of general and polytechnical education.

2. To take note that twenty-five years after the promulgation of the historic decree of the Communist Party and Government of the USSR dated May 16, 1934, regarding the teaching of geography in the school, there has been a reduction in the volume and depth of study of the geography of the Soviet Union.

In case the new draft program of geography is adopted, the geography of the Soviet Union will be studied to a considerably lesser extent than pupils study their own country in other states.

The congress categorically objects to the contemplated reduction of the courses of USSR geography in the eight-year school and of USSR economic geography in the ninth-grade and considers that an important place should be assigned in the program to these geography courses.

3. It is resolved to note that our schools remain almost the only ones in the world where a course in general geography with the fundamentals of geology, a course having great general educational and ideological significance, is lacking in the upper classes. To note also the absence, at present, of geography examinations in the schools, which diminishes the requirements for geographic knowledge on the part of the pupils.

4. To propose to the Council of the Geographical Society of the USSR that it acquaint the government of the USSR and the union republics with the viewpoint of the congress concerning the geography situation in our schools.

5. To consider it wrong, from the viewpoint of the ideological education of the pupils, to abolish the introductory fourth-grade course in the geography of the Soviet Union and to replace it by a course in natural science with elements of geography.

The congress recommends to the ministries of education of the union republics that they retain this course in its previous form and scope.

6. To consider it extremely important, from the viewpoint of rearing pupils in the spirit of Soviet patriotism, to intensify the krayevedeniye local-area study elements in the school geography programs and, in particular, to introduce into the programs of courses in USSR geography for the eight-year school and in USSR economic geography in the upper classes good-sized sections studying the geography of the republic, oblast, (kray, ASSR), as well as the city and rayon in which the school is situated.

7. To note that the Geographical Society still embraces only a small part of Soviet geography teachers and has faced up to the schools' needs to an entirely insufficient degree. To propose to the Council and to the branches and sections of the Society that they take measures to enroll geography teachers widely as members of the Society and organize consultations by geographer scientists for teachers and the issuance of special bulletins to aid teachers.

8. The congress instructs the Council to take measures to stimulate the

scientific and methodological guidance of school and extra-scholastic local area studies, to raise geographic culture, to prevent onesidedness in favor of sports and tourism and to integrate school excursions with the stationary work of local-area study circles.

B. Regarding Higher Geographic Education.

1. It is resolved to note that during the last five years the geography faculties of the higher educational institutions have done a great amount of work in training and educating young geographers.

However, the congress notes that the reform of higher school work is being effected too slowly by geographers.

2. It is resolved to instruct the Council of the Society to direct the attention of the ministries of education of the union republics to the advisability of giving priority to the employment of geographers with a university education for teaching in middle schools having a number of parallel classes, in addition to graduates from teachers colleges.

3. In accordance with the law on the improvement of ties between school and life, it is resolved to recommend to the geography staffs of universities that they strengthen ties with economic organizations and that, along with the training of students for teaching, they prepare to the same extent geographers with sufficiently integrated training for work in production organizations.

4. To obligate the branches and sections of the Geographical Society of the USSR to take an active part in discussing the programs and geography teaching plans for the higher education institutions.

5. To instruct the Council of the Society to hold conferences at the central organization and the major branches on questions of the methods of teaching the geographic disciplines, the content and organization of integrated field work, and to work out a unified system of field training for the future geography teacher.

6. To recommend to the geographers of the higher schools that they expand their scientific research under contract with economic organizations.

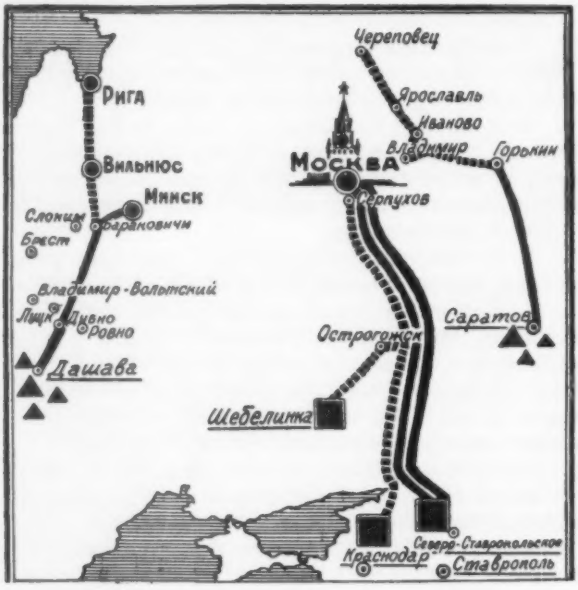
7. To obligate the Council and the branches and sections of the Society to promote the development of the scientific work of the higher educational institutions by discussing the scientific work of the teachers of these educational institutions, as well as by helping to include them in the field parties of scientific and economic institutions conducting research in the area where the higher educational institution is located.

8. To instruct the Council to bring before the Ministry of Higher Education and the ministries of education of the union republics and before the Presidium of the All-Union Central Council of Trade Unions the question of encouraging scientific tourism by geographer teachers of the middle and higher schools both in the USSR and abroad, since scientific tourism by geographers is of importance in the raising of the level of geography teaching and scientific work in the field of geography.

NEWS NOTES

By Theodore Shabad

New Gas Lines. The Saratov-Gor'kiy gas line, 652 kilometers long, was completed in October 1960. It is to be extended next year to Vladimir, Ivanovo, Yaroslavl' and Cherepovets, a distance of 550 km. The pipeline, fed by natural-gas fields in the Saratov area, will supply gas to the industrial centers of Central European Russia northeast of Moscow. Another gas line, about 700 km. long, was completed in October between the Dashava natural-gas fields in the Carpathian foothills of the Ukraine and Minsk, capital of Belorussia. The 665-km. Dashava-Minsk line, consisting of 800-mm pipe, passes through Dubno and Baranovichi. From Baranovichi it is to be extended to Vilna and Riga. A third gas line was being completed at the end of 1960 from the North Caucasus gas fields to the Moscow area. It is the 1020-mm pipeline from the gas fields in Krasnodar Kray to Serpukhov, south of Moscow. Two pipelines already link the Stavropol fields of the Northern Caucasus with Moscow. The Seven-Year Plan 1959-65 calls for the laying of 26,000 km. of gas pipelines. More than 3,000 km. were laid in 1959 and more than 4,000 km. in 1960 (Ekonomicheskaya Gazeta, Oct. 28, 1960).



Natural-Gas Deposits
- Large reserves
- Average reserves

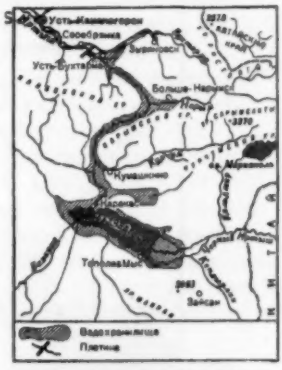
Gas Pipelines
- in operation
- under construction

Ust'-Ilim Power Station Site Selected. A government commission has selected the site of the Ust'-Ilim hydroelectric station of the Angara River north of the mouth of the Ilim River at Tolstyy Mys. The selection was made despite local protests (Soviet Geography, June 1960, Pages 68-70) that the construction of the station below the mouth of the Ilim River would flood the Ilim valley, an important agricultural area in a region where farm land is at a premium. The Ust'-Ilim station, with a planned capacity of more than 4 million kw., will be the third on the Angara River (see Soviet Geography, June 1960, map on Page 64) (Sovetskaya Rossiya, Sept. 4, 1960).

Petroleum Refineries Open. A new oil refinery at Irkutsk began operations in August 1960. It is to be supplied by a crude-oil pipeline from the Bashkir-Tatar fields. A second new oil refinery, at Ryazan' in central European Russia, began operations in September. It is also supplied by crude oil from the Tatar fields (Ekonomicheskaya Gazeta, Sept. 3, 1960; Sovetskaya Rossiya, Sept. 28, 1960).

Shallow-Draft Tankers on Caspian Sea. Shallow-draft tankers able to enter the delta channels of the Volga River now move directly from Baku to Astrakhan' and from Astrakhan' to Makhach-Kala without stopping for transshipment at the "12-foot roads," 100 miles south of Astrakhan'. The introduction of the new tankers follows criticism (Soviet Geography, June 1960, Page 75) of the costly transshipping of oil products in the Volga River delta (Ekonomicheskaya Gazeta, Sept. 30, 1960).

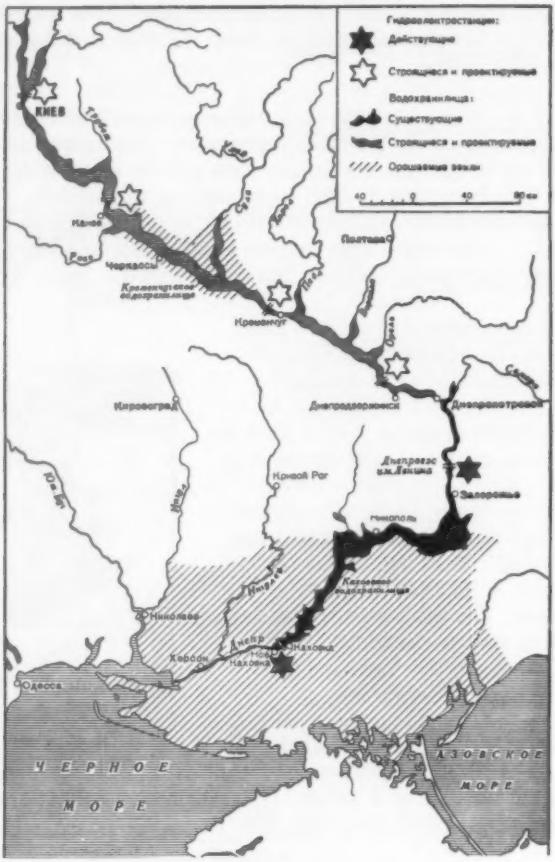
Bukhtarma Hydro Station Starts Operations. The first 75,000-kw generating unit was installed at the Bukhtarma hydro station in August 1960, followed by a second unit in October. The ultimate capacity is 455,000-kw. The Bukhtarma station, situated at the new town of Serebryanka, is the second hydroelectric station completed on the Irtysh River in eastern Kazakhstan. The first is the Ust-Kamenogorsk station at Ablaketka. The third station is planned to be built at Shul'ba, below Ust'-Kamenogorsk. The Bukhtarma station has one of the highest dams in the USSR, with a 67-meter difference in level between the reservoir and the river below the dam. Navigation will be made possible by a lock of four chambers. The Bukhtarma reservoir will have an area of 5,500 square kilometers, merging with Lake Zaysan and raising the level of the lake by 6 meters. (Kazakhstanskaya Pravda, Sept. 21, 1958; Aug. 20, 1960; Oct. 23, 1960).



Bukhtarma Reservoir

Kremenchug Hydro Station Reaches Full Capacity. The twelfth and last 57,200-kw generating unit was installed at the Kremenchug hydro

station on the Dnieper River in the Ukraine in November 1960, bringing the total capacity to 625,000 kw. The initial capacity had been planned for 450,000 kw, but was subsequently expanded. The Kremenchug station is situated at the settlement named Khrushchev above the city of Kremenchug. Construction of the station began in 1954, but lagged for three years and was speeded up after 1957. The twelve generating units were all installed beginning in December 1959. The Kremenchug station is the third hydroelectric plant to be completed on the Dnieper River. The others are the Dnieper station at Zaporozh'ye, originally designed for 650,000 kw., and the Kakhovka station at Novaya Kakhovka, with a capacity of 312,000 kw. A fourth station is under construction at Romankovo, above Dneprodzerzhinsk, where the first generating units are to be installed in 1961. Other Dnieper stations are planned near Kanev and Kiev. (Pravda, Nov. 5, 1960)



Hydroelectric Stations on the Dnieper River

Legend:

Hydroelectric stations	Reservoirs
in operation	filled
under construction	under construction
or planned	or planned
	Irrigation areas

Kiev Subway Opens. A subway opened in Kiev in November 1960 linking the high, right bank of the Dnieper River with the city's railroad station. The subway will be extended eastward to Darnitsa, industrial suburb on the left, low bank of the river, as well as westward to the city's western suburbs (Pravda Ukrainy, Nov. 5, 1960).

Brody-Uzhgorod Oil Pipeline Under Construction. Work has started on construction of the Brody-Uzhgorod oil pipeline in the western Ukraine. The pipeline, leading across the Carpathian Mountains, is the first section of the southern branch of the Volga-Central Europe pipeline system that will carry crude oil from the Kuybyshev fields to Czechoslovakia, Hungary, Poland and East Germany (Soviet Geography, June 1960, Page 76) (Pravda Ukrainy, Nov. 22, 1960).

Uzbek Fluorspar Mine Opens. The Naugarzan fluorspar mine is situated in the Kurama Mountains, on the Uzbek-Tadzhik border southeast of Tashkent, at an elevation of 1,800 meters. The deposit is located on the inaccessible Tadzhik slope and access to the deposit was obtained by digging a 5-km. tunnel from the Uzbek side. The fluorspar is processed at the Toy-Tyube fluorspar concentrator, 25 miles south of Tashkent. Fluorspar is essential for the electrolytic reduction of aluminum (Sovetskaya Latviya, Oct.23,1960).

Nickel Smelter Under Construction. A new nickel smelter is under construction at the Buruktal nickel-and-cobalt mine of Orenburg Oblast in the southern Urals (Soviet Geography, June 1960, Page 77). A new town associated with the nickel project is named Svetlyy. It became a so-called workers settlement in August 1960 and is planned to have a population of 60,000 by 1965 (Sovetskaya Latviya, Oct. 18, 1960).

Superphosphate Plant Opens. The Chardzhou superphosphate plant of the Turkmen SSR, under construction since 1953, began operations in July 1960, when the sulphuric acid department started production. The first superphosphate fertilizer is expected to be produced in the spring of 1961. The plant is situated in Komsomol'sk (until 1957 known as Kaganovichesk), a southern suburb of Chardzhou. It is based on the supply of phosphate from the Karatau Mountains in southern Kazakhstan and sulphur from the Gaurdak mine in easternmost Turkmenia. When completed, the plant is expected to furnish half the cotton fertilizer needed by the Turkmen SSR (Turkmenskaya Iskra, Jan. 3, 1958; Nov. 6, 1959; July 13,1960).

Stalingrad Hydro Plant Nears Full Capacity. The installation of the 20th 115,000-kw. generating unit at the Stalingrad hydroelctric station on the Volga (Sovetskaya Moldaviya, Nov. 7, 1960) has brought the station's total capacity to 2,300,000 kw. and has made it the world's largest hydro plant in operation, exceeding the one at Kuybyshev. The ultimate designed capacity of the Stalingrad station is 2,563,000 kw.

Eastern Half of Moscow Belt Highway Opens. A 48-km. section of the Moscow belt highway between the Yaroslavl' and Podol'sk highways opened in November 1960. The entire belt highway, 109 km. long, is to be completed in 1962 (Bakinskiy Rabochiy, Nov. 11, 1960). The belt highway marks the new city limits of Moscow (Soviet Geography, December 1960, Page 90).

Second Section of Kara-Kum Canal Completed. The Murgab-Tedzhen section of the Kara-Kum Canal has been completed (Pravda, Nov.18, 1960) (For further details and map see Soviet Geography, June 1960, Page 74).

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